Agency: Commerce, Community and Economic Development

Grants to Named Recipients (AS 37.05.316)

Grant Recipient: Bering Sea Fisherman's Association **Federal Tax ID:** 92-0074000

Project Title: **Project Type:** Planning and Research

Bering Sea Fishermen's Association - Arctic Yukon-Kuskokwim Sustainable Salmon Initiative

State Funding Requested: $5,000,000 **House District:** 38 / S

One-Time Need

Brief Project Description:

The Arctic Yukon Kuskokwim Sustainable Salmon Initiative is the result of a proactive and collaborative approach to addressing salmon declines threatening subsistence communities.

Funding Plan:

Total Cost of Project: $5,000,000

	Funding Secured		Other Pending Requests		Anticipated Future Need	
	Amount	*FY*	*Amount*	*FY*	*Amount*	*FY*
Federal Funds	$20,500,000	FF 02-06	$5,000,000	FF 2011		
Total	$20,500,000		$5,000,000			

Detailed Project Description and Justification:

On January 15, 2010, the U.S. Secretary of Commerce, Gary Locke declared a fisheries disaster for Yukon River Chinook salmon in response to extremely low salmon returns in 2008 adn 2009. This request should be considered adequate for meeting the federal 25% match requirement under the Magnuson-Stevens Act, Section 312(a). This declaration falls within a period of time where a series of poor returns of salmon to the Yukon River, Kuskokwim River and the rivers draining into Norton Sound in the late 1990s and early 2000s prompted a total of fifteen disaster declarations by the Governor of Alaska and federal agencies. Some AYK stocks have been in a decline for more than a decade and a half, leading to severe restrictions on commercial and subsistence fisheries and creating numerous hardships for the people and communities that depend heavily on the salmon fishery. This request directs funds to a stakeholder managed process begun in 2002. The Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative is the result of a proactive and collaborative approach to addressing salmon declines threatening subsistence communities. The AYK Sustainable Salmon Initiative (AYK SSI) has begun the difficult work of understanding the causes of the declines in the region by collaboratively funding a number of salmon research projects in the region. However, many critical salmon research needs remain unfunded at this time. With the leadership and collaboration of the AYK SSI member organizations; Association of Village Council Presidents, Tanana Chiefs Conference and Kawerak Inc., the Alaska Department of Fish and Game, the National Marine Fisheries Service, the U.S. Fish & Wildlife Service and the Bering Sea Fisherman's Association, the AYK SSI is the largest example of co-management of research funding addressing pacific salmon within the Pacific Rim and is one of the largest successful experiments in the co-management of fisheries and wildlife in North America.

Funds will be spent in the following priorties:

1. Marine survival of salmon is more affected by variability in ocean temperature and environmental variables than by

For use by Co-chair Staff Only:

$1,125,000 Approved

11:44 AM 5/5/2010

Contact Name: Tim Grussendorf
Contact Number: 465-4453

variability in marine fishing mortality.
2. Spawning escapement and subsequent egg deposition are important determinants of the abundance of the next generation of salmon.
3. Selective fishing over time has altered the size, sex ratio, and life-history type composition of salmon populations.
4. Adult salmon abundance in streams shows regular periodic changes and has varied widely over the past two centuries.
5. In the AYK region, human populations will increase over the next fifty years, but alternative affordable food resources will become more available, causing fishing and harvest of salmon to remain the same or to decline.
6. The cumulative effects of habitat loss by mining activites can be severe at local levels but not at regional scales except in the Norton Sound region.
7. Models that predict historical variablilty will forecast future salmon abundance.
8. Escapement goal setting to ensure sustainable fisheries can best be accomplished by using stock-recruitment models in combination with life-history and habitat-based modeling.
9. Stock diversity and salmon stock abundance can be sustained by regulation of fishing gear and fishing times using an escapement goal management approach.
10. A combination of demographic and ecosystem variables affects the variability of salmon returns in the AYK region.
11. Future salmon abundance will support expected harvest demand and provide sufficient spawning salmon to maintain self-sustaining salmon returns in the AYK region.

Project Timeline:

The amount requested is calculated to be used in part as the State of Alaska's 25% matching funds related to the 2008-2009 commercial fishery disaster declaration made on 1/15/09 by Commerce Secretary Gary Locke. In conjunction with federal funds this amount will be distributed as salmon research projects are implemented between 7/1/10 and 6/30/15.

Entity Responsible for the Ongoing Operation and Maintenance of this Project:

N/A

Grant Recipient Contact Information:

Name:	Karen Gillis - Bering Sea Fisherman's Association
Address:	110 W 15th Ave
	Anchorage, AK 99501
Phone Number:	(907)279-6519
Email:	karen.gillis@bsfaak.org

Has this project been through a public review process at the local level and is it a community priority? [X] Yes [ ] No

For use by Co-chair Staff Only:

Contact Name: Tim Grussendorf
Contact Number: 465-4453

11:44 AM 5/5/2010

PROTECTING *the future of* SALMON

Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative

AYK SUSTAINABLE SALMON INITIATIVE

2008
Annual Report

Memorandum of Understanding *enacted on February 21, 2002*

I. Introduction

Salmon returns to western Alaska have been in decline for more than a decade, and the pace of decline has accelerated in recent years. Poor returns of Chinook and chum salmon to the Yukon River, Kuskokwim River, and rivers draining into Norton Sound, (collectively known as the AYK Region) have led to severe restrictions on commercial and subsistence fisheries and to repeated disaster declarations by the state and federal governments. The commercial Chinook harvest on the Yukon River in 2000 was less than 10% of the historical long-term average. The 2000 season followed similar low returns and disaster declarations in 1998 and 1993, and particular salmon run failures in various western Alaska locations throughout the 1990s. In the Norton Sound region, some commercial fisheries have been closed for a decade, and many subsistence fisheries been restricted or closed.

This Memorandum of Understanding has grown from a unique collaboration among regional Alaska Native organizations and the Alaska Department of Fish and Game. The concept of forming a body to provide direction to response efforts for the salmon failures in western Alaska developed through discussions between the Alaska Department of Fish and Game and the "AYK Coalition". The AYK Coalition is comprised of three Alaska Native organizations providing services to over 100 federally recognized Alaska Native Tribes in the AYK region: the Association of Village Council Presidents, the Tanana Chiefs Conference, and Kawerak, Inc. Also included in the coalition is the Bering Sea Fisherman's Association, a non-profit organization that has been active in AYK fisheries issues, including research, for decades. Common concerns over recent drastic declines in salmon returns coalesced into an action plan at a meeting of the parties on June 8, 2001 in Anchorage, Alaska. The culmination of the action plan is this AYK Sustainable Salmon Initiative Memorandum of Understanding (hereinafter referred to as AYK SSI MOU).

II. Purpose

The purpose of the AYK SSI MOU is to provide a mechanism for its signatories to engage in a collaborative effort to develop and implement a comprehensive research plan for the AYK region utilizing the $5 million appropriated for this initiative by Congress for federal fiscal year 2002 (Pacific Coastal Salmon Recovery Fund), and any other funds appropriated or otherwise dedicated to this initiative. The two committees formed by the AYK SSI MOU will develop and implement the AYK Salmon Research and Restoration Plan (hereinafter referred to as the Research and Restoration Plan).

III. Guiding Principles

• Funds available for AYK salmon research and restoration should be spent in a manner to obtain the greatest good for the fisheries and users in the AYK area and the ecosystems upon which they depend. This includes the use of traditional and cultural knowledge, participatory research, and capacity building. The AYK region for the purpose of this MOU encompasses the service delivery areas of Kawerak, Association of Village Council Presidents, Tanana Chiefs Conference and the near and off shore areas of river drainages flowing into, the Bering Sea north of Cape Newenham and south of Shishmaref.

• To maximize the use of available funds, they shall be used to the degree possible and consistent with this MOU, in coordination with other fishery agencies, funding sources and plans. Other agencies include the U.S. Geological Survey, Yukon River Drainage Fisheries Association, National Park Service, the Bureau of Land Management, the Council of Athabascan Tribal Governments, U.S./Canada Yukon River Joint Technical Committee, the North Pacific Research Board, the North Pacific Anadromous Fisheries Commission, and the Gulf Ecosystem Monitoring program. Collaborative research jointly funded with such entities should be undertaken to the maximum extent practicable.

The intent of this MOU is not to duplicate past or existing research but to add to current expenditures in the AYK area for fishery research. Thus, it is the intent that funds administered under the MOU not be viewed as a source to replace funding for research and management projects that were ongoing at the time this MOU was entered into or were undertaken after the MOU was in place without the involvement of or funding by the AYK SSI. It is particularly important that the funds administered pursuant to this MOU not be viewed by agencies and organizations as a means to shift budget priorities to other issues while relying on AYK SSI funds as replacement funds for conducting long-standing, routine, in-season fishery management projects in the AYK. There may be cases, however, where a funding source is no longer available for an ongoing research or management project the continuation of which is important to fulfilling the goals of this MOU. It is therefore the intent of this MOU that a party seeking replacement funds for an ongoing research or management project demonstrate to the Steering Committee that prior funding sources for the project are no longer available in sufficient amounts to conduct the project and the reasons why such funding sources are no longer available and that; 1) the project clearly satisfies the requirements and objectives of this MOU and the Research and Restoration Plan once adopted; 2) the agency or organization seeking replacement funding for a current project is contributing the maximum amount (either in money or in-kind contributions or both) that it can reasonably make available to the project taking into consideration its funding sources and other responsibilities; and 3) the agency or organization seeking replacement funding has in good faith sought funding for the project from other reasonably available sources. Moreover, the Signatories to this agreement agree to continue to actively seek other funds to undertake necessary fishery research regarding AYK salmon and shall make an annual report to the parties of this agreement of such efforts.

• Available funds shall be used for research and restoration consistent with the Research & Restoration Plan for AYK salmon stocks developed through the Scientific and Technical Committee Steering Committee process described below.

• Development of the Research & Restoration plan shall take into account existing research plans of the region and shall be based upon recommendations forwarded by a Scientific and Technical Committee (STC) of disciplinary experts. The STC shall be composed of members that represent relevant scientific disciplines. STC members will exercise, to the greatest degree possible, their independent judgment about research and restoration needs and priorities. The Research and Restoration Plan shall be a comprehensive plan that identifies research needs and priorities including freshwater, near shore and marine phases of AYK salmon stocks.

• Decisions regarding adopting and implementing the Research and Restoration Plan, shall be made by an eight member Steering Committee composed of regional, state and federal representatives. The Steering Committee shall make its final decisions only after reviewing comments and recommendations made by the public and the Scientific and Technical Committee on preliminary decisions. The Steering Committee shall allow adequate time and resources to ensure the spirit of this initiative and an open process.

• The Research and Restoration Plan will go beyond providing a single, static prescription of research activities. Instead, it will provide an ongoing process whereby research activities are guided, selected, reviewed and modified over time to reflect the outcome and knowledge obtained from research and restoration activities.

IV. Steering Committee

1. Membership

The Steering Committee membership will consist of eight members selected by the following agencies or organizations (one member each except ADF&G: one biologist, one social scientist from the Subsistence Division):

Association of Village Council Presidents
Kawerak, Inc.
Tanana Chiefs Conference
Alaska Department of Fish and Game
U.S. Fish and Wildlife Service
National Marine Fisheries Service
Bering Sea Fishermen's Association

Once the initial members are appointed, the Steering Committee shall adopt bylaws that will govern the appointment or election and term of the Chairperson, quorums, appointment of alternates, and other matters necessary for governing the Steering Committee.

2. Steering Committee Decision-Making Process

A consensus decision making process will be used by the Steering Committee. A separate, non-voting Scientific and Technical Committee (STC) shall make recommendations to the Steering Committee. The formations and responsibilities of the STC are detailed in Section 5 below.

3. Steering Committee Responsibilities

The Steering Committee shall adopt a Research and Restoration Plan for the AYK salmon fisheries after considering the recommendations of the STC. The Steering Committee shall:

• Make decisions on how available funding shall be expended. In making decisions to expend funds for research or management projects prior to adoption of the AYK Research and Restoration Plan, the Steering Committee shall, after considering the recommendation of the STC, base such decisions on which projects will provide the most benefit to the fisheries and users in the AYK area and the ecosystems upon which they depend.

• Exercise its authority by deciding the scope, timing, amount and other necessary elements for all grants or other applications necessary to secure appropriated funds, and any modifications thereto. Projects authorized by the Steering Committee shall further specify research and restoration goals of the approved plan. The Steering Committee shall formally review and approve any proposal and any amendment thereto prior to submittal to the funding source.

• Have all necessary authority to solicit projects, work with scientific or other experts, identify and prioritize projects for funding, review project results, and ensure data and results are freely available to the public.

• Require the timely completion of projects and facilitate the communication of research results to other interested agencies and individuals annually.

• Appoint six STC members from nominations from the signatories and other interested parties. The nomination process, membership and disciplinary balance of the STC are described below in Section 5.

• Review and approve reports to the Secretary of the Department of Commerce (or other funding agency) concerning the results of research conducted through the Research and Restoration Plan.

• Ensure the public is provided the opportunity to participate in Steering Committee meetings and to review and comment on proposed projects.

• The Steering Committee shall ensure the efficient and effective expenditure of funds. Whenever possible, projects shall be coordinated with other related research and restoration projects. Jointly funded research projects that meet the goals and priorities set by the Steering Committee shall be solicited.

4. Fiscal Responsibility

Fiscal responsibility for administration of the $5 million appropriated for this initiative by Congress for federal fiscal year 2002 (Pacific Coastal Salmon Recovery Fund) rests with the State of Alaska. Expenditures of these funds will be in accordance with the fiscal procedures and procurement policies of the State of Alaska. As a signatory to the MOU, State of Alaska agrees, as allowed by law, to expend these funds in accordance with the decisions of the Steering Committee.

5. Steering Committee Meetings

The Steering Committee shall meet as necessary to fulfill its responsibilities and conduct business.

Meetings of the Steering Committee shall be open to the public, and the public shall be provided reasonable notice of official meetings.

Meetings shall include, to the greatest degree practicable, participation by organizations active in fisheries research and restoration issues. Such organizations include, but are not limited to, the North Pacific Research Board, the Exxon Valdez Oil Spill Trustee Council, the Northern Fund of the Pacific Salmon Commission, and the Southeast Sustainable Salmon Initiative. These organizations shall be given reasonable notice of all meetings. Copies of all relevant STC recommendations, grant applications, project results and other information will be provided to these organizations and the public upon request. Comments, and direct participation when appropriate, shall be actively solicited from these organizations on relevant issues before the Steering Committee.

Notice of meetings and copies of relevant grant applications, project results and other information shall be provided to the Alaska Board of Fisheries, the North Pacific Fishery Management Council, and the Federal Subsistence Board upon request.

V. Scientific and Technical Committee

1. STC Membership

The Scientific and Technical Committee (STC) shall consist of six members nominated by the signatories to this MOU and the public. The Steering Committee shall select STC members from these nominations.

Members of the STC shall be selected based upon their knowledge, expertise and ability to fulfill the responsibilities of the STC as outlined in this agreement.

Membership shall represent scientific disciplines including, but not be limited to, fisheries sciences, socioeconomic sciences, aquatic habitat restoration, fish culture, marine ecology, freshwater ecology, community and population modeling, and population genetics. Members of the STC may be employed by the signatories to this MOU, and two members shall be ADF&G employees (one biologist, one social scientist from the Subsistence Division). However, no more than one member may be employed by any one of these groups or a federal agency, the Bering Sea Fishermen's Association or a regional Native organization. At least two members must be selected from the private or academic sector.

In addition to relying on its official members, the STC may consult with other scientific and local-knowledge experts in the development of the Research and Restoration Plan.

2. STC Responsibilities

STC members will exercise their best independent professional judgment to advance understanding of salmon abundance and distribution in the AYK area and the fisheries they support, independent of the governmental, academic, or private sector they may represent.

The STC shall:

• Choose a Chair and Vice-Chair for the STC by consensus. The Chair will work closely with the Chair of the Steering Committee. The Vice Chair will act in the capacity of the Chair whenever the Chair is absent from a meeting.

• Within 12 months of the inception of the STC, develop an initial Research and Restoration Plan for AYK salmon fisheries that is consistent with the Guiding Principals of the MOU, and recommend this plan to the Steering Committee. The plan shall identify research needs, ensure the efficient expenditure of funds, not duplicate but complement other relevant research, and recommend research priorities.

• Develop recommendations for restoration projects that will increase salmon returns to the AYK area.

• Develop a protocol for reviewing and ranking research and restoration project proposals and recommend this protocol to the Steering Committee.

• Evaluate suggested projects based on their merit and make recommendations to the steering committee.

• Regularly review the research and restoration plan and ongoing projects throughout the life of this MOU, including reviewing project design and the utility of continuing ongoing projects, and make relevant recommendations to the SC to ensure research and restoration is conducted effectively and efficiently, and make recommendations for augmenting, updating and revising research questions including regular review of the Research and Restoration Plan.

VI. Support for the Steering Committee and STC

The following support activities will be paid from funds appropriated for this effort:

• Travel and accommodation expenses for the individuals selected to serve on the Steering Committee and the Scientific and Technical Committee.

• Professional Service fees for academic and private sector involvement on the Steering Committee and STC and support services for committee activities.

• Logistical support for the meetings of the Steering Committee and the Scientific and Technical Committee, the coordination of communication and public outreach efforts, administrative support and the hiring of staff.

VII. Mutual Agreement and Understandings

It is mutually agreed that:

• Nothing in this agreement obligates any party in the expenditure of funds, or for future payments of money, in excess of appropriations authorized by law and administratively allocated for these purposes.

• Nothing in this agreement is intended to conflict with federal, state, or local laws or regulations, or international treaties or agreements. If there are conflicts, this agreement will be amended at the first opportunity to bring it into conformance.

• External policy and position announcements relating specifically to this agreement maybe made only by mutual consent of the signatories.

• All signatories shall meet on at least an annual basis to discuss matters relating to this agreement. Many of the criteria and assumptions contained in this agreement are interim assumptions and subject to further refinement. Signatories may request an earlier review. No revision shall be binding to signatories without the written consent of all signatories; provided that a revision that is proposed by the Steering Committee shall become effective 30 days after the Signatories and Steering Committee members are notified of the proposed revision if a majority of the Signatories have consented in writing to the proposed revision and no Signatory has delivered a written objection to the proposed revision.

• The effective date of this agreement shall be from the date of the final signature.

• Any signatory may terminate its participation in this agreement by providing to the other parties notice in writing 30 days in advance of the date on which its termination becomes effective. However, the State of Alaska agrees that in the event the State were to terminate early, the State will again initiate discussions with the parties, with the intent of developing an alternative research and restoration agreement. The State will not unilaterally proceed with a research using funds appropriated or otherwise dedicated for this sustainable salmon initiative in the absence of an agreement among signatories.

Inside

Annual report photo credits: Christian E. Zimmerman, Clinton Goods, Richard Bell and Douglas B. Molyneaux. Salmon illustrations by Joseph R. Tomelleri.

The above photo of a juvenile sockeye salmon, used in the 2007 AYK SSI annual report, should have been credited to Richard Bell. © UW Press.

AYK SUSTAINABLE SALMON INITIATIVE

Greetings,

The Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYK SSI) is a partnership between public and non-profit institutions which provides a forum for native regional organizations and state and federal agencies to cooperatively identify and address salmon research and restoration needs. The AYK SSI is one of the largest examples of cooperative management of research addressing the full life history of Pacific salmon.

Within this 2008 Annual Report you'll find the successes of the AYK SSI emblazoned across the pages as an illustration of the cooperation of our seven AYK SSI member organizations. These groups seek to achieve research and restoration efforts that lead to better understanding of salmon populations in the AYK in order to bring relief to resource-dependent people in the Arctic, Yukon, and Kuskokwim. It is through this innovative partnership that we have created a legacy of salmon science.

Our integrative approach is predicated on a high level of attention to all aspects of the salmon life cycle. Guided by our Research and Restoration Plan we've sought to fund selected salmon research that will provide opportunities to make rapid progress in understanding the causes of the declines and recoveries that we've experienced. We strive to expand today's approaches to salmon science while ensuring our research finds application.

This is a time of change. AYK SSI's current funding is coming to a close and future funding is unknown even though there is still much work to be done. What is not changing is AYK SSI's commitment to our mission of service. As we adapt to changing conditions, AYK SSI will continue to provide the highest level of scientific integrity possible within our portfolio of funded projects.

Through our Research and Restoration Plan, 2003 Workshop, 2007 Symposium (watch for the published proceedings which is due out in 2009), our open meetings, project reports, website, and these annual reports we offer a wide range of opportunities for individuals to access the results of our research and track our progress.

Please explore the Initiative in greater detail in the pages of this annual report and visit us on the web at www.aykssi.org.

Dr. John White
Chairman, Steering Committee

Bering Sea Fishermen's Assoc.
110 W. 15th Ave, Unit A
Anchorage, Alaska 99501

(907) 279-6519
(888) 927-2732

WWW.AYKSSI.ORG

Steering Committee

Member Organization	Member Name	Alternate
Bering Sea Fishermen's Association 110 W. 15th Ave, Unit A Anchorage, AK 99501	**John White - Chairman** P.O. Box 190 Bethel, AK 99559 (907) 543-3778 jwhite@unicom-alaska.com	**Karen Gillis** (907) 279-6519 (888) 927-2732 toll free karen.gillis@bsfaak.org
Alaska Department of Fish and Game Division of Subsistence 1300 College Road Fairbanks, AK 99701	**Jim Simon - Vice Chairman** (907) 459-7317 jim.simon@alaska.gov	**Jim Magdanz** (907) 442-1713 jim.magdanz@alaska.gov
U.S. Fish and Wildlife Service 1011 E. Tudor Road Anchorage, AK 99503	**Rod Simmons** (907) 786-3830 rod_simmons@fws.gov	**Steve Klein** (907) 786-3605 steve_klein@fws.gov
Alaska Department of Fish and Game Commercial Fisheries Division 333 Raspberry Road Anchorage, AK 99518	**John Linderman** (907) 267-2115 john.linderman@alaska.gov	
Tanana Chiefs Conference 122 First Avenue, Ste. 600 Fairbanks, AK 99701	**Michael Smith** (907) 452-8251 x 3256 michael.smith@tananachiefs.org	
Kawerak, Incorporated P.O. Box 948 Nome, AK 99762	**Weaver Ivanoff** Box 113 Unalakleet, AK 99684 (907) 624-3025	**Merlin Henry** Box 30 Koyuk, AK 99753 (907) 963-3651
Association of Village Council Presidents P.O. Box 219 Bethel, AK 99559	**Jennifer Hooper** (907) 543-3521 jhooper@avcp.org	**Tim Andrew** (907) 543-3521 tandrew@avcp.org
National Marine Fisheries Service DOC NOAA NMFS 11305 Glacier Highway Juneau, AK 99801	**Peter Hagen** (907) 789-6096 peter.hagen@noaa.gov	

Scientific and Technical Committee

Chris Zimmerman - Chairman
USGS, Biological Resources Division
4230 University Dr., Suite 201
Anchorage, AK 99508
(907) 786-7071
czimmerman@usgs.gov

Katherine W. Myers
School of Aquatic and Fishery Sciences
University of Washington
Seattle, Washington 98195
(206) 543-1101
kwmyers@u.washington.edu

Chuck Krueger
Fishery Science Consulting
3800 Queen Oaks
Chelsea, MI 48118
(734) 433-2364
ckrueger@glfc.org

Greg Ruggerone
Natural Resources Consultants, Inc.
1900 Nickerson, Suite 207
Seattle, WA 98119
(206) 285-3480
gruggerone@nrccorp.com

Eric Volk
AK Department of Fish & Game
Commercial Fisheries Division
333 Raspberry Road
Anchorage, AK 99518
eric.volk@alaska.gov

Caroline Brown
AK Department of Fish & Game
Division of Subsistence
1300 College Rd.
Fairbanks, AK 99701
(907) 459-7319
caroline.brown@alaska.gov

Purpose and Goals of the Program

Alaska salmon and freshwater fish have been critical to the survival of the people and wildlife in the Arctic-Yukon-Kuskokwim (AYK) region for thousands of years. Encompassing over 40% of the state, the AYK region includes: the watersheds of the Norton Sound region up to and including the village of Shishmaref, the Yukon River Watershed within Alaska, the Kuskokwim River Watershed, (including the coastal watersheds north of Cape Newenham), and the Bering Sea marine ecosystem.

Salmon returns to western Alaska have been subject to 15 state and federal disaster declarations within the last 15 years. Low salmon runs create numerous hardships for the people and communities that depend so heavily on this fishery resource. Poor returns of Chinook and chum salmon to the Yukon River, Kuskokwim River, and rivers draining into Norton Sound, have led to severe restrictions on commercial and subsistence fisheries.

In order to identify the causes of the declines and recoveries, native regional organizations led the charge, joined with state and federal agencies to form an innovative partnership to cooperatively address salmon research and restoration needs.

This partnership includes the Association of Village Council Presidents, the Tanana Chiefs Conference, Kawerak, Inc., Bering Sea Fishermen's Association, Alaska Department of Fish and Game, National Oceanic and Atmospheric Administration Fisheries, US Fish & Wildlife Service, plus additional native, governmental and non-governmental ex-officio partner institutions. In 2001, the partners established the AYK Sustainable Salmon Initiative (AYK SSI) through a Memorandum of Understanding and created a process and structure to insure the coordinated expenditure of research funds.

The AYK SSI is governed by an eight-member Steering Committee and advised by a six-member Scientific and Technical Committee composed of members representing relevant scientific disciplines. (See a list of committee members on page 3.) To date, Congress has appropriated $20.5 million to support this interagency, multi-disciplinary research effort to determine the cause of the decline of salmon in the region. This is the largest salmon research coalition in the state and one of the largest most diverse groups working to rebuild salmon runs on the entire Pacific coast.

The purpose of the AYK Sustainable Salmon Initiative is to foster expanded fishery research in order to help understand the causes of the declines and recoveries of these stocks and to support sustainable salmon management in the region by:

1. Identifying pressing research and information needs throughout the salmon lifecycle and by funding proposals related to the freshwater, near shore and marine phases of AYK salmon stocks, as well as research proposals spanning multiple life-history phases.

2. Facilitating coordination and cooperation among research and management institutions by developing a dynamic, comprehensive, long range Research and Restoration Plan for the region.

Outreach and Communication of Research and Planning Activities

The Initiative seeks to develop a program that is inclusive through a strong communication plan and public involvement. To meet this goal, the Initiative seeks to gather and communicate through public meetings, workshops, and symposia. The Initiative is strongly committed to seeking a more inclusive process through capacity building.

Finalized Salmon Research & Restoration Plan

A joint effort between the AYK SSI Scientific and Technical Committee and the National Research Council

The aim of this long-range, strategic science plan was to identify the conceptual frameworks, research themes and research priorities needed to guide research funded through the AYK Sustainable Salmon Initiative. Development of the Arctic-Yukon-Kuskokwim Salmon Research & Restoration Plan (AYK SSI RRP) helps to ensure that available funds are spent wisely.

This project, targeting salmon stocks in the Arctic-Yukon-Kuskokwim region, benefits salmon, fishers and sustainable salmon management by:

• Drawing on the best available science to identify effective ways to investigate and understand the complexity of marine and freshwater ecosystems which support these salmon stocks;

• Providing scientific analysis and review to support the development of a high-quality, long-range restoration and research plan for the AYK region; and

• Helping to ensure that the appropriated funds target high-priority research projects by identifying knowledge gaps, and prioritizing future salmon research themes and questions.

The AYK SSI RRP is available for download on our website … www.aykssi.org.

The 2007 AYK SSI Symposium

What do we know about salmon ecology, management and fisheries?

A symposium of invited and contributed papers was held during the week of February 5, 2007. The symposium addressed a variety of topics related to biology, human dimensions, and management issues and considered their implications to the AYK Research and Restoration Plan and the AYK SSI program. The symposium assessed the history, and current status of fish stocks, and helped point toward future research directions.

The success of the symposium rested solely with the participants. We had over 300 registered guests. They included a blend of rural and native leaders, state and federal agency representatives, and some of the world's leading social and biological scientists.

The Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative is in the process of compiling and editing the proceedings of our February 2007 Salmon Symposium. The purpose of the proceedings, entitled Sustainability of the Arctic-Yukon-Kuskokwim Salmon Fisheries, is to communicate what is known, and needs to be known, about salmon and fisheries in the Arctic-Yukon-Kuskokwim region of Alaska, including:

- ecological processes that cause change in salmon populations,
- the effects of varying salmon runs on rural communities, and
- management of salmon fisheries in the region.

In addition to the book, the AYK SSI produced a DVD which provides an overview of the AYK SSI and the symposium based on interviews with symposium attendees.

If you are interested in receiving these or any other materials from AYK SSI, please contact: Karen Gillis, Bering Sea Fishermen's Association, 110 W. 15th Avenue, Unit A, Anchorage, AK 99501, 1-888-927-2732, karen.gillis@bsfaak.org.

High Priority Hypothesis	Example Questions
Research Framework: Salmon Life Cycle	
1. Marine survival of salmon is more affected by variability in ocean temperature and other environmental variables than by variability in marine fishing mortality.	• What is the relative importance of marine mortality, relative to mortality at other life stages, in establishing abundance of returning adult salmon to spawning streams? • What are the sources and extent of fishing mortality (bycatch, interception fisheries, and targeted commercial fisheries) on different AYK stocks? • Do density-dependent interactions within and among salmon species affect marine survival, growth, and returning adult abundance? • How do salmon migration routes vary among populations from year to year, and what effect do oceanic distributions have on survival, growth, and returning adult abundance?
2. Spawning escapement and subsequent egg deposition are important determinants of the abundance of the next generation of salmon.	• What is the relationship between adult-run size abundance and subsequent spawning-run abundances? • What is the relative contribution of different stocks within a watershed to the entire adult salmon run, and what are the current and anticipated effects of subsistence, commercial, and sport catch on salmon stock structure? • What are the effects of fishing, disease (e.g., Ichthyophonus) and predation on survival of salmon from freshwater entry to spawning?
3. Selective fishing over time has altered the size, sex ratio, and life-history type composition of salmon populations.	• Do fisheries exert differential fishing mortality among stocks within a drainage system or provide a selection pressure against certain phenotypic traits? Has Local and Traditional Knowledge (LTK) recorded long-term changes in the maximum size and sex ratios of salmon?
4. Adult salmon abundance in streams shows regular periodic changes and has varied widely over the past two centuries.	• How do abundance and distribution of salmon populations vary over long-time scales (20-200 years)?
Research Framework: Human Systems	
5. In the AYK region, human populations will increase over the next fifty years, but alternative affordable food resources will become more available, causing fishing and harvest of salmon to remain the same or to decline.	• What are the interactions between socio-economic variables and catch of salmon in the AYK region? Addressing this theme requires the integration of LTK with traditional socio-economic research. • Will predicted human demand for salmon exceed the predicted sustainable yield of AYK salmon populations over the next several decades?
6. The cumulative effects of habitat loss by mining activities can be severe at local levels but not at regional scales, except in the Norton Sound region.	• What are the individual and cumulative effects on salmon from human activities such as mining, boat traffic, and point and non-point sources of freshwater and marine pollution? Are traditional scientific assessments of human impacts consistent with LTK?
Research Framework: Synthesis & Prediction	
7. Models that predict historic variability will forecast future salmon abundance.	• Has the historic variation in salmon abundance been due to the ecosystem shifting among multiple stable states? Is there evidence of the loss of any AYK salmon stocks?
8. Escapement goal setting to ensure sustainable fisheries can best be accomplished by using stock-recruitment models in combination with life-history and habitat-based modeling.	• What methods exist for determining escapement goals (e.g., habitat-based, ecological, spawner-recruit models), and which ones or combinations are best to use in different drainage systems?
9. Stock diversity and salmon stock abundance can be sustained by regulation of fishing gear and fishing times using an escapement goal management approach.	• What management regimes and methods are available to affect salmon catch and stock structure?
10. A combination of demographic and ecosystem variables affects the variability of salmon returns in the AYK region.	• What combination of demographic and ecosystem variables, operating on any or all of the life history stages, best predicts salmon abundance by stock?
11. Future salmon abundance will support expected harvest demand and provide sufficient spawning salmon to maintain self-sustaining salmon returns in the AYK region.	• Will future salmon abundance support future harvests and bycatch, including subsistence, commercial, and sport fisheries? Are the predictions the same for all species in all regions? • What possible management strategies could be used to allocate fishery resources in times of scarcity and conserve salmon populations?

*Note: Hypotheses presented above reflect statements about how processes **may** cause salmon abundance to vary. Hypotheses should not be interpreted as statements of fact nor statements of belief of the AYK SSI, but are propositions about how the salmon system may work – they may be true or they may be false! The hypotheses are posed as positive statements designed for studies to either prove or disprove. It may be helpful for the reader to insert before each hypothesis, "To determine whether. . .". Please also note that the example questions presented are not intended to be the only questions of importance. The questions may serve to stimulate researchers to craft their own hypotheses and questions as they develop research proposals.*

This figure shows the total number of funded projects addressing each priority. Note that more than one priority is assigned to many of the projects, thus the number of total projects listed exceeds the total number funded. Projects are assigned only to the priority or priorities which are directly addressed by the project objectives.

HIGH PRIORITY FRAMEWORKS

	11 HIGH PRIORITY HYPOTHESES	# of projects funded under each hypothesis
Salmon Life Cycle	1. Marine survival of salmon is more affected by variability in ocean temperature and environmental variables than by variability in marine fishing mortality.	12
	2. Spawning escapement and subsequent egg deposition are important determinants of the abundance of the next generation of salmon.	25
	3. Selective fishing over time has altered the size, sex ratio, and life-history type composition of salmon populations.	3
	4. Adult salmon abundance in streams shows regular periodic changes and has varied widely over the past two centuries.	3
Human Systems	5. In the AYK region, human populations will increase over the next fifty years, but alternative affordable food resources will become more available, causing fishing and harvest of salmon to remain the same or to decline.	2
	6. The cumulative effects of habitat loss by mining activities can be severe at local levels but not at regional scales, except in the Norton Sound region.	0
Synthesis & Prediction	7. Models that predict historic variability will forecast future salmon abundance.	8
	8. Escapement goal setting to ensure sustainable fisheries can best be accomplished by using stock-recruitment models in combination with life-history and habitat-based modeling.	6
	9. Stock diversity and salmon stock abundance can be sustained by regulation of fishing gear and fishing times using an escapement goal management approach.	4
	10. A combination of demographic and ecosystem variables affects the variability of salmon returns in the AYK region.	13
	11. Future salmon abundance will support expected harvest demand and provide sufficient spawning salmon to maintain self-sustaining salmon returns in the AYK region.	0

The AYK Sustainable Salmon Initiative (AYK SSI) has invested in fishery research in order to help understand the causes of the decline of salmon stocks and to support sustainable salmon management in the region. Listed here are projects funded through the AYK SSI. To obtain reports related to any of the projects listed here please contact Karen Gillis at (907) 279-6519 or via email: karen.gillis@bsfaak.org.

AYK SSI Project #810

Kuskokwim River Coho Salmon Genetics

Investigator(s): **Penny Crane, U.S. Fish and Wildlife Service, Conservation Genetics Laboratory**

Project Period: **June 2008 – March 2011**

AYK SSI Funding: **$247,677**

Proposal Abstract: Coho salmon spawning in the upper portion of the Kuskokwim River upstream of the Takotna River represent an important component of the genetic and life history variation in the watershed. However, there are no assessment programs monitoring this stock. In this project, we will obtain run timing and relative abundance information for this stock by estimating the stock composition of coho salmon sampled from the Bethel test fishery for four temporal strata per year over a three year period.

AYK SSI Project #809

Historical Analyses of AYK & Asian Chum Salmon

Investigator(s): **Bev Agler, Alaska Department of Fish and Game, Mark, Tag, and Age Lab, and Natural Resources Consultants, Inc.**

Project Period: **July 2008 – March 2010**

AYK SSI Funding: **$134,106**

Proposal Abstract: Climate change can have significant effects on salmon growth and survival, and the Bering Sea has experienced significant climate shifts in recent decades. Studies indicate that pink salmon can adversely affect growth and survival of sockeye, chum, and Chinook salmon at sea. There is increasing evidence that western Alaska stocks of salmon are food-limited during their offshore migrations in the North Pacific Ocean and Bering Sea. High seas salmon research has suggested that inter- and intra-specific competition for food and density-dependent growth effects occur primarily among older age groups of salmon, when stocks originating from all geographic regions around the Pacific intermingle and feed in offshore waters. Releases of Asian hatchery chum salmon increased rapidly from 1970 to 1990 (approximately 2.3 billion fish per year), and they are now the dominant chum stock in the Bering Sea. Preliminary data analyses of some AYK data suggest that these mechanisms may affect growth and abundance of chum salmon in the AYK region. We will test the hypothesis that climate change and pink salmon have adversely affected growth and abundance of Norton Sound and Kuskokwim chum salmon and Asian chum salmon. We also plan to test the hypothesis that interactions with Asian chum salmon have affected growth and abundance of Norton Sound and Kuskokwim chum salmon. These hypotheses will be tested by reconstructing seasonal and annual growth of Norton Sound and Kuskokwim chum salmon from historical collections of scales 1969-2007 and by reconstructing the seasonal and annual growth of Asian chum salmon from historical scale collections from Russian (1962-2007) and Japanese (1950-2007) chum salmon. These datasets will be compared with climate indices and the alternating-year pattern of pink salmon, which provides a natural experimental control to test the hypotheses.

AYK SSI Project #808

Rapids Student Data Collection 2008-2010

Investigator(s): **Stan Zuray, Rapids Research Center**

Project Period: **June 2008 – March 2011**

AYK SSI Funding: **$33,470**

Proposal Abstract: Presently there is a lack of consistent sex, length, weight, girth and visible disease information on Yukon River Chinook salmon bound for the Upper River and Canada. These types of data are essential for the effective management of the many salmon species that migrate upstream each year. Student technicians have been trained to collect fisheries data since 2001 in the Rampart Rapids area located at river mile 731, approximately 40 miles upstream of the village of Tanana, Alaska. This project gives students an opportunity to participate in data collection for biological studies and to develop their interest in future fisheries work. The collected data are comprised of Chinook salmon sex, length, weight and girth during the Chinook salmon season and visual inspection of changing flesh color and fat content in chum salmon. Species are inspected for disease conditions with a special emphasis on Ichthyophonus disease prevalence in Chinook salmon. The data from these studies provide valuable information for the management of Chinook and chum salmon and migratory whitefish. This information has been identified as a priority at many Federal Regional Advisory Council, State Advisory Committees, and Yukon River Drainage Fisheries Association meetings.

AYK SSI Project #807

Norton Sound Chinook Salmon Growth and Production

Investigator(s): **Greg Ruggerone, Natural Resources Consultants, Inc., U.S. Geological Survey, and Alaska Department of Fish and Game**

Project Period: **May 2008 – March 2010**

AYK SSI Funding: **$74,906**

Proposal Abstract: Catches of Chinook salmon in Norton Sound (subsistence, commercial and sport) have declined significantly since 1999. In Norton Sound, most Chinook salmon return to rivers in eastern Norton Sound, including the Unalakleet and Shaktoolik rivers. Total abundance of Chinook salmon returning to the Unalakleet River declined 60% during 2000 to 2006 compared with abundance since the mid-1980s. Both the Unalakleet and Shaktoolik Chinook stocks are classified by ADFG as "Stock of Concern" because they are unable to support harvests. Factors causing the decline are unknown and the AYK SSI identified the cause of the decline as a high priority issue. Using salmon scale measurements that provide an index of growth, we will 1) create a database of Unalakleet Chinook salmon growth during each year in freshwater and the ocean (years 1981 to 2007), 2) compare Chinook salmon growth with indices of Chinook salmon abundance, ocean-climate shifts and other environmental variables, 3) compare Unalakleet growth with that of Yukon and Kuskokwim Chinook growth to evaluate the extent that these stocks respond to widespread environmental regime shifts versus local conditions, 4) examine Chinook growth during each life stage in relation to adult age, gender and previous-year growth as a means of identifying unique life history traits of these Chinook salmon, and 5) share the scale data with the ongoing project, "Climate-Ocean Effects on Chinook." The project adds value to existing projects while addressing several Questions of Special Concern and High Priority Hypotheses. The proposed retrospective project will improve the understanding of factors that influence abundance and life history traits (growth in relation to gender and age at maturation) of Norton Sound Chinook salmon, which are vital to the people of this region.

AYK SSI Project #806

Fecundity of Yukon River Chinook Salmon

Investigator(s): **Jeff Bromaghin, U. S. Fish and Wildlife Service, Fisheries and Ecological Services, Alaska Department of Fish and Game, and Fairbanks Fish and Wildlife Field Office**

Project Period: **May 2008 – March 2009**

AYK SSI Funding: **$58,712**

Proposal Abstract: Fecundity (number of eggs per female) is a vital population characteristic directly linked to the productivity of fish stocks. Even so, data on the fecundity of Yukon River Chinook salmon are extremely limited, and most data have been collected in the middle portion of the drainage. Given the range of migration distance among Yukon River Chinook salmon and the energy stores required to complete long migrations, one might reasonably expect differences in fecundity to exist among stocks within the drainage. Indeed, recently collected data on Yukon River Chinook salmon fecundity suggest that fecundity does differ among stocks. More importantly, the available data suggest that fecundity has declined by approximately 25% over the last 20 years. While the cause of this apparent decline is unknown, several fish species have been found to reduce fecundity in response to the size-selective harvest of large fish. Unfortunately, the reliability of the most recently collected data is in doubt due to anomalies in tissue handling procedures. Given the importance of this information, we will collect paired genetics and fecundity data near the mouth of the river to investigate differences in fecundity among Yukon River Chinook salmon stocks. This investigation will result in the first comprehensive evaluation of fecundity within the entire Yukon River drainage, and provide additional evidence regarding the apparent decline

in fecundity. Knowledge of stock differences in fecundity will be valuable for understanding differences in stock productivity and response to alternative management strategies. Such information will also be helpful for interpreting the sex ratio, age composition, and perhaps other measures of the quality of escapements. Furthermore, knowledge of stock fecundity may contribute importantly to investigations of other traits relating to population productivity, such as individual egg size, the total investment in reproductive tissues, and juvenile growth rate and survival.

AYK SSI Project #805

Productivity of Kuskokwim Juvenile Coho Salmon

Investigator(s): **Greg Ruggerone, Natural Resources Consultants Inc., and Alaska Department of Fish and Game**

Project Period: **May 2008 – March 2010**

AYK SSI Funding: **$76,663**

Proposal Abstract: The Kuskokwim River supports one of the largest coho salmon runs in Alaska. Coho salmon is the primary salmon species harvested in the Kuskokwim commercial salmon fishery, averaging approximately 495,000 coho salmon per year from 1980 to 1996. Coho harvests declined precipitously beginning in 1997, averaging only 201,000 coho per year, 1997 to 2006. Approximately 35% of the statewide subsistence catch of coho salmon occurs in the Kuskokwim area. Little is known about the productivity of juvenile coho in Kuskokwim tributaries, including the extent to which productivity varies among rivers. Growth is an important index of salmon productivity. Using historical and new coho scale collections, we will estimate and compare juvenile coho length-at-age in eight Kuskokwim area tributaries during four recent years, compare these growth estimates with temperature, stream characteristics, and indices of adult coho productivity and pink salmon abundance (prey source) in the eight tributaries. We will also estimate length-at-age of juvenile Kuskokwim River coho during 1967 to 2006 and compare growth with air temperature during the growing season. The project adds value to existing projects while addressing two Questions of Special Concern/High Priority Hypotheses. It also relies upon local Kuskokwim residents that would help collect samples. This project will identify the degree to which coho size at age varies among Kuskokwim tributaries and contributes to biodiversity, which is important for sustaining salmon harvests.

AYK SSI Project #804

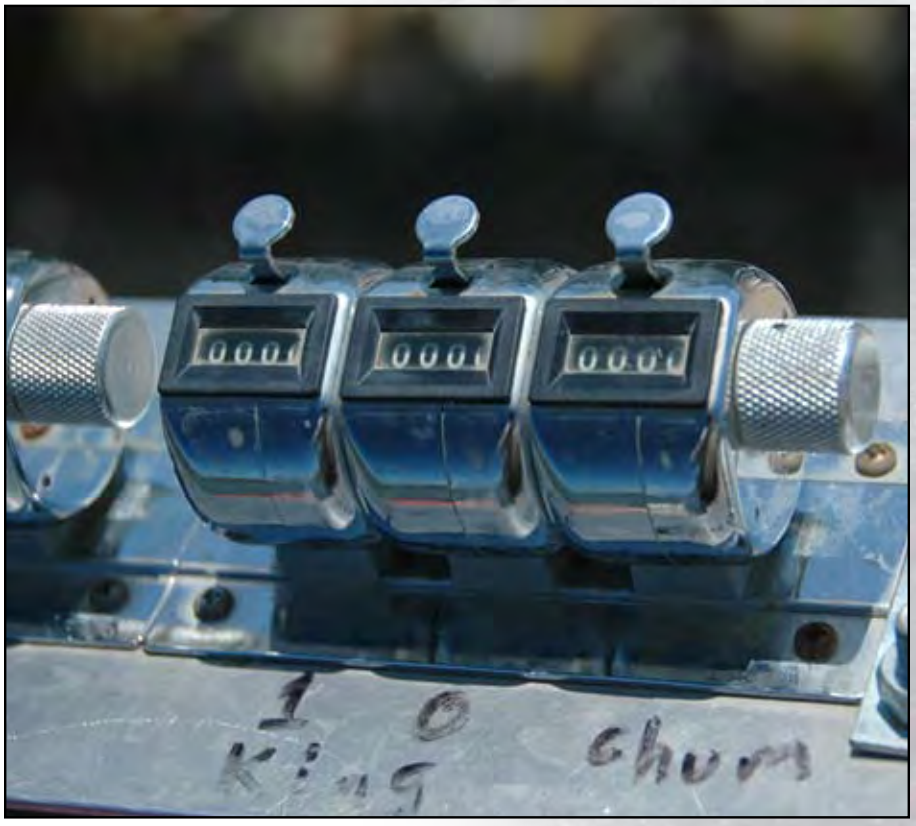
Testing Production Models in the Fish River

Investigator(s): **Charlie Lean, Norton Sound Economic Development Corporation, LGL Alaska Research Associates, Inc., and Alaska Department of Fish and Game**

Project Period: **May 2008 – April 2011**

AYK SSI Funding: **$540,106**

Proposal Abstract: Habitat-based production models allow development of salmon production estimates from known habitat characteristics. Such production estimates can be especially useful in Norton Sound, where there are currently no biological escapement goals for coho salmon, and our understanding of habitat and production relationships is only beginning. We will test the hypothesis that coho salmon smolt (and subsequent adult) production can be predicted from indicators of watershed size, among watersheds with contrasting habitat quantity and type, by testing models that appear effective in one watershed (Nome River) in two sub-drainages with differing habitat on another (the Fish River). If transferable, it increases confidence that production models can be rapidly and inexpensively generated on a range of 3rd through 5th -order watersheds throughout the region, generating biologically-based estimates of the number of spawners that habitats can support. Our testing will entail capture and marking juvenile



salmon to estimate abundance, providing a value-added research platform to address other high priority needs stated in the RFP. We will mark and tag juvenile salmon in a way that allows computation of freshwater survival during downstream migration, and marine survival from emigration to return. Our field validation of habitat use predictions will allow assessment of abiotic and biotic variables driving the abundance and distribution of juvenile salmon (especially Chinook and coho) in AYK watersheds. Smolt production and marine survival estimates are products that then allow estimation of adult returns, which can be compared to historic returns to assess the likelihood of under-escapement and the potential for harvest demand to exceed supply. Understanding functional links between habitat attributes, smolt production and adult returns provides foundation for establishing biologically meaningful coho salmon escapement goals throughout Norton Sound, and assessing the adequacy of adult returns for escapement and harvest.

AYK SSI Project #803

Landscape Predictors of Coho Salmon

Investigator(s): **Kelly Burnett, U.S. Forest Service, Pacific Northwest Research Station, University of Alaska Fairbanks, Earth Systems Institute, LGL Alaska Research Associates, Inc., Oregon State University, Department of Forest Science, and U.S. Geological Survey**

Project Period: **May 2008 – March 2011**

AYK SSI Funding: **$473,073**

Proposal Abstract: Lack of data concerning habitat controls on salmon abundance in the AYK hampers abilities to predict effects of habitat change or to know whether freshwater factors contribute to observed changes in salmon returns. Field surveys are feasible in only a fraction of streams. For regional estimation, other approaches are needed. Recent research suggests that statistical approaches may be adapted to estimate salmon habitat and relative abundances from targeted field surveys and digital geospatial data (e.g., stream, terrain, and vegetation). Alaska's size and remoteness, however, limit the availability of geospatial data and data are lacking on critical processes, such as the extent to which streams freeze and reduce over-wintering habitat area. Thus, we will: 1) determine the feasibility, accuracy, and costs of developing high-resolution geospatial data directly from remote sensing imagery and indirectly from spatial patterns in the imagery; and 2) determine relationships of these data with juvenile coho salmon abundances to predict and identify factors affecting fish distribution and productivity. We will: 1) compare digital elevation models (DEMs) derived from satellite sensors; 2) compare stream networks delineated directly from satellite imagery and indirectly from DEMs; 3) characterize stream networks, including reaches in different ice classes (open water, ice over water, and frozen to the bottom), using satellite imagery, field data, and DEMs; 4) collect summer field data on juvenile coho habitat and abundances; 5) link all data in a GIS; and 6) develop, test, then apply statistical models to map habitat and relative abundances of juvenile coho from geospatial data. Key outcomes include DEMs, stream networks, and maps of habitat suitability and relative abundance for juvenile coho salmon in the Nome River, statistical models for the Nome River with potential applicability to coho salmon elsewhere in Norton Sound, and methods for developing fundamental geospatial data across the AYK region.

AYK SSI Project #802

Ecotypic Variation in AYK Sockeye Salmon Stocks

Investigator(s): **Megan McPhee, The University of Montana, Flathead Lake Biological Station, and University of Washington**

Project Period: **May 2008 – March 2011**

AYK SSI Funding: **$287,044**

Proposal Abstract: Year-to-year fluctuations in salmon run size cause difficulty for managers and fishermen trying to anticipate salmon returns and associated expenditures/income in the next fishing season. Recent evidence from the successful Bristol Bay sockeye salmon fishery has shown that "biocomplexity" contributes to regional run stability via the portfolio effect. In this fishery, regional runs are composed of multiple local populations with diverse life-history and physical characteristics adapted to their specific spawning localities. Because of this high trait diversity over different spawning locations, each local population responds individually to annual variation in climate, weather, and local feeding/growing conditions. Due to this diversity in response to changing conditions, in any one year some stocks respond favorably while other stocks diminish, but the overall run size remains relatively stable. Because sockeye salmon are becoming more important to fisheries in the AYK region, our study will determine whether the biocomplexity that contributes to run stability in Bristol Bay is also present in Kuskokwim drainage sockeye runs. To this end we will measure biocomplexity in these sockeye runs by quantifying diversity in life-history, morphological (body shape), and genetic traits across different spawning aggregations. We will then compare our results from the Kuskokwim to data that have already been collected from Bristol Bay to determine the extent to which sockeye salmon runs in the Kuskokwim can be expected to fluctuate annually at the regional scale, based on the biocomplexity principle. We emphasize that in this proposal we are seeking funding to collect data from the AYK region only.

AYK SSI Project #801

Kuskokwim River Coho Salmon Investigations

Investigator(s): **Doug Molyneaux, Alaska Department of Fish and Game, Commercial Fisheries Division, Bue Consulting LLC, and Kuskokwim Native Association**

Project Period: **May 2008 – March 2011**

AYK SSI Funding: **$735,174**

Proposal Abstract: Coho salmon are the most commercially valuable salmon species returning to the Kuskokwim River. Recent fluctuations in both run abundance and commercial markets dictates the need of fishery managers to better understand the dynamics of Kuskokwim River coho salmon stocks. We will use a mark-recapture project including radiotelemetry to assess the stock-specific run timing, distribution, and abundance of coho salmon in the Kuskokwim River drainage. We will also develop a statistical model to estimate historical total annual coho salmon run abundance from 1981 to 2009 using existing harvest, test-fish, and tributary escapement data. Our statistical model will also allow estimation of total run abundance in further years using available data inputs. Our findings will determine whether the timing of commercial fishing openings can be manipulated to target or conserve specific sub-area stocks, and whether there are sub-areas of the Kuskokwim River drainage that support a disproportionate fraction of the total coho run. Total abundance estimates are also necessary as a context from which to focus genetic baseline collections; interpret the impacts of climatic shift, changes in ocean productivity, impacts of interception fisheries, and changes in management practices.

AYK SSI Project #735

Alaska Native Science & Engineering Program (ANSEP)

Investigator: **Herb Schroeder, University of Alaska Anchorage, School of Engineering**

Project Period: **November 2007 – March 2011**

AYK SSI Funding: **$644,766**

Proposal Abstract: Alaska Native people have lived on the land in the Arctic-Yukon-Kuskokwim region for thousands of years. They have survived by living their lives in harmony with nature, subsisting upon fish and other resources in the area. Yet Alaska Natives are significantly underrepresented in professional positions related to fisheries science, fisheries management, and related professions. Former ADF&G Commissioner Campbell noted in a letter to ANSEP, "Since statehood, we have had a chronic problem recruiting Alaska Natives and rural students into biology-related career positions within the Alaska Department of Fish and Game (ADF&G). Fragmented attempts aimed at attracting students into careers in biology over the past 30 years have met with very limited success." As a result, nonlocal biologists hold virtually all professional fisheries positions in this region, including those biologists working for tribal organizations in the region. This has resulted in a 1) high rate of turnover among these personnel, especially in rural hub communities, and 2) an absence of sustained, in-region fisheries research and management expertise. Over a five year period within the AYK region and the State, we will develop and implement a sustainable longitudinal educational pathway that leads Alaska Native and rural students from their sophomore year in high school through University graduation with a fisheries or related biological science degree.

AYK SSI Project #731

Smolt Age, Growth, and Productivity of Seward Peninsula Sockeye Salmon Stocks

Investigator(s): **William Smoker, University of Alaska Fairbanks, School of Fisheries and Ocean Sciences, and Alaska Department of Fish and Game**

Project Period: **June 2007 – May 2009**

AYK SSI Funding: **$80,098**

Proposal Abstract: Scales have been collected from smolts and adults from different sockeye populations in each of several years over the past decade. A UAF graduate student (L Wilson) will measure growth and age of smolts from these scale collections by standard ADF&G methods. Variation of growth and age will be analyzed with respect to 1) historical environmental and biological conditions (e.g. pre- and post fertilization of Salmon L, smolt density, plankton production) 2) smolts leaving a system and adults surviving from those smolts as a test for any survival size advantage among smolts. We will use statistical methods of data exploration, correlation analysis, and model selection to identify important sources of variation, particularly to detect an effect of fertilization on the productivity of Salmon L. and whether larger smolts are more likely to survive. This is a test of and alternative to the high priority hypothesis (in the salmon life cycle framework) that escapement is the important determinant of recruitment, i.e. that recruitment is affected by the size of smolts and in turn by lake productivity. This knowledge will inform salmon resource managers in their process of establishing sustainable harvest practices for the stocks.

AYK SSI Project #725

Heritability of Traits in Wild Chinook Salmon

Investigator(s): **Jeffrey B. Olsen, U.S. Fish and Wildlife Service, Conservation Genetics Laboratory, Kenai Fish and Wildlife Field Office, and National Marine Fisheries Service**

Project Period: **May 2007 – March 2010**

AYK SSI Funding: **$224,260**

Proposal Abstract: Many Chinook salmon in the Kuskokwim River are harvested using "large mesh" (8 inches or larger) gillnets that preferentially capture older and larger fish. There is interest in determining if this selective fishery has a population-level impact on traits such as adult size and age. In order to fully evaluate this issue realistic estimates of trait heritability are needed. This selective fishery may also indirectly influence abundance if reproductive success (number of adult progeny) is greater for larger fish. In order to evaluate this issue estimates of family size for a sample of parents of known length are needed. In this study we examine both issues in Chinook salmon from the Tuluksak River. Our objectives are to 1) estimate the heritability of adult size, growth rate, and age and the genetic covariance among these traits, in males and females, and 2) determine if family size is related to size of adult parent. We will use recently developed pedigree reconstruction methods to identify full-sib and half-sib groups from the 2003 cohort (adults born in 2003). These groups will be used to estimate heritability and evaluate family size. The results of this study will provide salmon fishers and fishery managers a better understanding of the possible impacts of a size selective harvest on Chinook salmon.

AYK SSI Project #724

Fall Chum Salmon Distribution in the Upper Tanana River

Investigator(s): **Bonnie Borba, Alaska Department of Fish and Game, Commercial Fisheries Division, Tanana Chiefs Conference, and U.S. Geological Survey**

Project Period: **May 2007 – June 2009**

AYK SSI Funding: **$636,555**

Proposal Abstract: Fall chum salmon originating in the Tanana River represent on average thirty percent of the total run abundance within the Yukon River drainage and are harvested in important subsistence and commercial fisheries en route to spawning locations. The relationship between known tributary escapements and drainage abundance estimates suggest that a significant contribution to the fall chum salmon population maybe mainstream spawners. Previous telemetry results indicate large concentrations of adult chum salmon in the mainstem Tanana, but have yet to document spawning. The main objectives of this project include the following: 1) confirm that fall chum salmon are using the mainstem Tanana River for spawning; 2) identify and characterize mainstem spawning habitats used by fall chum salmon; 3) determine relative contributions of mainstem spawners to overall upper Tanana fall chum salmon populations; and 4) construct mainstem spawning habitat location prediction models. Objectives will be achieved by on site confirmation of fall chum salmon spawning in the mainstem in 2007 followed by additional radio tagging to determine proportions in 2008. The impacts of urbanization and resource development including agriculture, timber, minerals, and petroleum are the greatest within the Tanana River drainage. The benefits provided by this project include documentation of mainstem spawning locations and a habitat location prediction model. The information from this study is needed to assist in developing the resources in the area while responsibly protecting habitat that supports the fishery resource.

AYK SSI Project #721

Nome River Coho Salmon Abundance and Survival

Investigator(s): **Charlie Lean, Norton Sound Economic Development Corporation, LGL Alaska Research Associates, Inc., and LGL Environmental Research Associates, Inc.**

Project Period: **May 2007 – January 2010**

AYK SSI Funding: **$410,301**

Proposal Abstract: This project will continue work on a multi-year study to develop habitat-based coho salmon abundances in Norton Sound. The funds will add two additional years of smolt production estimates (2007 and 2008) and three years of marine survival estimates (from 2006-2008 smolt cohorts), yielding a total of 5 consecutive years of smolt production data and 4 consecutive years of marine survival data.

The extended series will directly help evaluate the utility of habitat-based approaches to assist with the development of escapement goals in Norton Sound drainages. The work will also provide the only empirical Norton Sound data able to address linkages between habitat and production, the relationships among a series of adult spawner escapements, marine vs. freshwater influences on survival, and the relative influences of parent year strength vs. habitat availability/limitations on future coho production. Each of these applications is described in more detail below.

Work thus far has generated coho smolt production estimates from 2004 through 2006. These estimates are used as a time series to compare annual production to detailed estimates of habitat quantity (developed in 2002 and 2003), as adult returns vary. Coded wire tags were added to smolts in 2005 and 2006, allowing estimates of marine survival for these cohorts. 2007 and 2008 are thus key years

in a series that has already been started by another funding initiative (with objectives phased in since 2002); continuation through 2008 will improve the project substantially by extending the data set at a time when some natural developments make it especially able to address key management and ecological questions.

AYK SSI Project #719

Genetic Analysis of Immature Bering Sea Chum Salmon

Investigator(s): **Christine M. Kondzela, NOAA Fisheries, Alaska Fisheries Science Center, Auke Bay Laboratory, and University of Alaska Fairbanks**

Project Period: **July 2007 – March 2010**

AYK SSI Funding: **$596,889**

Proposal Abstract: Chum salmon bycatch in the Gulf of Alaska and Bering Sea continues to create problems for the groundfish fisheries, particularly the Bering Sea trawl fisheries. Chum salmon are critical to the livelihood and culture of rural Alaskans as well as other issues including allocation among Alaskan users and between the U.S. and Canada. Between 1997 and 2002 unexpected, dramatic declines in returns to western Alaskan prompted 15 disaster declarations by the Governor of Alaska and federal agencies (AYK Scientific Technical committee 2005). Although those runs appear to be rebounding, incidental catches in the pelagic trawl fisheries have also increased dramatically. Central to bycatch questions are the origins and abundances of intercepted fish. The information about the marine distributions of chum salmon populations is sketchy at best, but knowledge of their ocean migration routes and abundances can help us understand productivity cycles and be a substantial aid in the conservation and management of fish resources. The availability of genetic tools that can estimate regional contributions of chum salmon to high seas aggregations make it possible to initiate analysis of samples that have been archived from incidental catches and from research sampling efforts in the Bering Sea and Gulf of Alaska over the past two decades. We have chosen a subset with which we will address questions about the distribution in time and space of chum salmon in the eastern Bering Sea. The questions we ask are: (1) What are the compositions of chum salmon aggregations in different regions of the eastern Bering Sea? (2) Do the distributions vary seasonally within a year in each area? and (3) Do the distributions vary among years? From those results we will begin to develop a conceptual ocean migration model and to analyze bycatch impacts of AYK chum salmon in the Bering Sea Pollock fishery.

AYK SSI Project #714

Future Climate/Habitat of AYK Ecosystems

Investigator(s): **James E. Overland, NOAA/Pacific Marine Environmental Laboratory, and University of Washington**

Project Period: **May 2007 – April 2008**

AYK SSI Funding: **$143,684**

Proposal Abstract: This project will provide AYK SSI with ecosystem forecasts out to 2030, based on evaluation of climate model results for western Alaska. These quantitative forecasts will focus on regional parameters known or hypothesized to be important to AYK salmon abundance, as demonstrated in previous work and through current and pending projects under the Synthesis and Prediction Framework of the AYK SSI program. Through description of the probable trends and variability in future climate and ecosystem conditions, this project will reduce the uncertainty currently faced by coastal communities, fishers, and marine resource managers. Projections will be based on recently available results from 17 state of the art coupled atmosphere-ocean-land climate models from research centers around the world, which are part of the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4). We have completed an initial screening of these models and found 11 that represent the late 20th century regional climate of the Bering Sea reasonably well. For the SSI we will localize the predictions from this reduced set of models, focusing on changes in precipitation, seasonal timing of runoff, temperatures, and general oceanic conditions in the eastern Bering Sea. By the end of the first project year a website will be established and maintained to facilitate community-wide discussion of ecosystem and community consequences of these forecasts. During the second year, in collaboration with AYK research partners and communities, we will help develop a consensus projection for future salmon runs in the AYK region. This project builds on the research team's previous experience and expertise in cooperating with colleagues and communities on ecosystem/climate studies in the Bering Sea and for other northern fisheries.

AYK SSI Project #712

Climate-Ocean Effects on Chinook Salmon

Investigator(s): **Katherine W. Myers, University of Washington, School of Aquatic & Fishery Sciences, and Kawerak, Inc.**

Project Period: **July 2007 – April 2010**

AYK SSI Funding: **$624,985**

Proposal Abstract: A high priority issue of the AYK SSI is to determine whether the ocean environment is a more important cause of variation in the abundance of salmon populations than marine

fishing. New analyses and syntheses of historical data, as well as the collection and analysis of new field and laboratory data, are needed to address this issue. The goal of this 3-year project (completed in April 2010) is to identify and evaluate life history patterns of use of marine resources (habitat and food) by Chinook salmon, and to explore how these patterns are affected by climate-ocean conditions in the Bering Sea and North Pacific Ocean. Specific objectives include: (1) develop a comprehensive high seas Chinook salmon database (1955-present) for AYK SSI, (2) map ocean distribution and migration routes of Chinook Salmon, (3) reconstruct histories of ocean age, growth, and size-selective mortality of Chinook salmon, (4) map climate and oceanographic conditions in regions where AYK salmon migrate, (5) collect new seasonal (summer, winter) food habits data, and evaluate variation in marine diets of Chinook salmon, (6) estimate consumption and growth efficiencies modeled under different climate scenarios; (7) map spatial and temporal variability in ocean growth potential; (8) simulate climate effects on age and growth, and (9) synthesize information on the ocean life history and climate-ocean effects on Chinook salmon. Results will benefit salmon, salmon fishers, and salmon fisheries of the AYK region by providing products and information that can be used to improve fishery management. The project, led by the High Seas Salmon Research Program, University of Washington, includes an international team of cooperating investigators. Methods include retrospective, graphical, and statistical analyses of existing data, fieldwork aboard Japanese research vessels in summer, labwork (diet, scale age and growth), computer mapping and spatial analyses, computer simulations of climate-ocean effects, local capacity building, and public outreach.

AYK SSI Project #711

Juvenile Salmon Dispersal: Drifter Based View

Investigator: **Thomas J. Weingartner, University of Alaska Fairbanks, Institute of Marine Science**

Project Period: **November 2007 – April 2010**

AYK SSI Funding: **$429,626**

Proposal Abstract: The region inshore of the 40 m isobath is both a critical habitat and a migratory corridor for juvenile salmon migrating from western Alaskan rivers to the ocean. Although this region bears critically on the early marine stages of salmon and is an important element of the Bering Sea ecosystem, the inner shelf has received little attention from oceanographers. Juvenile Chinook, pink, coho, and chum salmon distributions and oceanographic data suggest that nearshore waters flow northward and thence northwestward past Nunivak Island before spreading across the central Bering shelf. This pathway (and its variability) could influence salmon recruitment success because it places these fish in a cool, prey-poor, environment wherein predation by pollock is minimized. To examine possible salmon dispersal pathways we will deploy satellite-tracked drifters in lower Kuskokwim Bay between mid-May and mid-August in 2008 and 2009. We will deploy 32 drifters/year with deployments consisting of clusters of 3 – 4 drifters deployed at 10 – 12 day intervals. The field deployments will be conducted by the residents of Quinhagak on lower Kuskokwim Bay.

AYK SSI Project #708

Risk Assessment Framework for AYK Salmon

Investigator(s): **Jeremy S. Collie, University of Rhode Island, Graduate School of Oceanography, and Simon Fraser University**

Project Period: **September 2007 – April 2009**

AYK SSI Funding: **$65,680**

Proposal Abstract: Prior research on AYK pink and chum salmon has related the numbers of returning salmon (recruits) to the number of spawners and environmental conditions during the marine life stage. The next critical step in this research is to model

the dynamics of harvesting recruits. This project will develop population models of the entire salmon life cycle in a risk-assessment framework. The objectives are to (1) update existing stock-recruitment models with recent population and environmental data, (2) model the dynamics of commercial and subsistence fisheries, and (3) use simulation models of the entire salmon life cycle to assess risks (such as too few spawners, closure of upriver native fisheries, etc.) associated with different harvest rules. This research will provide a framework for synthesizing life history and environmental variables, which is one of the 2007 priorities. It will also answer several of the high-priority questions regarding the salmon life cycle by estimating stock-recruitment relationships and density-dependent interactions. The research will be conducted while the lead investigator (J. Collie) is at Simon Fraser University in 2007-2008. The population models for each salmon stock will be empirically based on population, catch, and environmental data. The product of this research will be a risk-assessment framework that can be used to evaluate harvest rules for AYK pink and chum salmon. This framework will be useful for determining, ahead of time, what managers might be able to do in the event of a future downturn in productivity of AYK salmon populations.

AYK SSI Project #702

Ecology and Demographics of Chinook Salmon

Investigator(s): **Mark S. Wipfli, University of Alaska Fairbanks, Alaska Cooperative Fish and Wildlife Research Unit, and Alaska Department of Fish and Game**

Project Period: **May 2007 – March 2011**

AYK SSI Funding: **$1,277,733**

Proposal Abstract: Stock-recruitment models do not take into account essential environmental conditions and processes that affect Chinook rearing and overwintering, and therefore lack rigor and reliability. The goal of this work is to improve our understanding of the way ecological processes regulate population size and generate annual variability in the abundance of adult Chinook salmon, (Oncorhynchus tshawytscha), returning to the Chena and Salcha Rivers. To achieve this goal we will pursue three lines of research. First, we will investigate the causes of density dependent mortality that regulates population size. Evidence suggests this occurs during the summer that juveniles rear in freshwater and that it is a consequence of competition for food and space. Second, we will investigate how seasonal patterns of stream discharge affect food production and the area and quality of profitable and safe feeding habitat. Preliminary analyses suggest annual variation in summer discharge may account for 75% of the variability around the stock-recruitment curve. Third, we will use a retrospective analysis to develop and test hypotheses about the way ecological processes generate annual variations in the abundance of Chinook salmon. We will employ what we learn from this analysis to develop a stock-recruitment analysis that incorporates environmental processes. The results of this analysis will allow biologists and managers to predict optimal escapements and forecast future returns. Juvenile Chinook will be captured with seines and minnow traps, and their densities, condition, and diets measured; adult numbers estimated via existing ADFG adult counts; and food resources (invertebrates) estimated with benthic and drift nets, and terrestrial infall traps.

AYK SSI Project #632

Stock-specific Forecast of AYK Chinook Salmon

Investigator(s): **William D. Templin, Alaska Department of Fish and Game, Gene Conservation Laboratory, and University of Washington**

Project Period: **May 2006 – April 2009**

AYK SSI Funding: **$472,700**

Proposal Abstract: Unanticipated declines of major stocks of Chinook salmon in Western Alaska prompt interest in the marine

migratory patterns and survival. Variable survival in the context of the changing marine environment confounds our ability to forecast run strength and manage these stocks. Additionally, record numbers of Chinook salmon were harvested as bycatch in the Bering Sea walleye pollock fishery in 2005. What impact might this bycatch have on returns to AYK drainages? We will create a run reconstruction model that may offer critical insight into marine survival of AYK stocks of Chinook salmon, ultimately providing a forecast tool for improved management. First, National Marine Fisheries Service marine surveys will provide age 1.0 Chinook salmon in the eastern Bering Sea collected during the summers of 2002-2006; we will use stock composition analysis and abundance estimates to approximate relative year class strength of contributing stocks. We will then perform stock composition and abundance estimates of subadults (by age class) in the Bering Sea trawl bycatch. The reconstruction model will use a cohort analysis to test the utility of the juvenile data and bycatch data to forecast run strength of AYK stocks.

AYK SSI Project #622

Natural Indicators of Salmon Run Abundance and Timing

Investigator(s): **Catherine Moncrieff, Yukon River Drainage Fisheries Association, and Alaska Department of Fish and Game**

Project Period: **May 2006 – April 2009**

AYK SSI Funding: **$203,669**

Proposal Abstract: This project seeks to understand the historical abundance, distribution, and health of salmon populations in subsistence fishing communities in the lower Yukon River drainage through the documentation and incorporation of local and traditional ecological knowledge (LTK). The principle investigators will focus ethnographic research on natural indicators of salmon run characteristics to explore patterns in Chinook, summer chum, and fall chum salmon runs. We will analyze data gained from key respondent interviews to understand the correlations between LTK natural indicators and salmon population dynamics. The study proposed here will take place for three years (2006-2009) in the five communities of Hooper Bay, Emmonak, St. Mary's, Grayling, and Kaltag. This research will primarily address the question of how LTK can inform our understanding of the changes in the abundance, distribution, and health of salmon populations, as described in the research theme "Linking Traditional/Local Ecological Knowledge and Conventional Approaches to Fisheries Research." Benefits of this research include the documentation and preservation of LTK regarding salmon, compilation of resource maps, and capacity building in communities and organizations.

AYK SSI Project #619

Juvenile Salmon Migration, Kwethluk River, Alaska

Investigator(s): **Christian E. Zimmerman, U.S. Geological Survey, Alaska Science Center, U.S. Fish and Wildlife Service**

Project Period: **May 2006 – April 2009**

AYK SSI Funding: **$ 372,580**

Proposal Abstract: Little to no information concerning juvenile salmon in the Arctic-Yukon-Kuskokwim region of Alaska is available. In the Kuskokwim River watershed, for example, the timing of migration and abundance of juvenile salmon has never been studied. In this study, we will estimate the population size of chum salmon smolts emigrating from the Kwethluk River, an important tributary in the lower Kuskokwim watershed. Using this estimate and an estimate of egg deposition, we will estimate survival from egg to smolt for chum salmon. In addition, we will determine the relative abundance and timing of migration of juvenile Chinook, coho, and pink salmon. This study will complement existing studies on the Kwethluk River and provide a synergistic and integrated approach to understanding freshwater salmon productivity from egg deposition to emigration.

AYK SSI Project #618

Kuskokwim Sockeye Salmon Investigations

Investigator(s): **Sara Gilk, Alaska Department of Fish and Game, Commercial Fisheries Division, Natural Resources Consultants, Inc., Kuskokwim Native Association, Association of Village Council Presidents, and National Park Service**

Project Period: **May 2006 – September 2008**

AYK SSI Funding: **$467,420**

Proposal Abstract: The role of sockeye salmon in the environment and its importance to the culture and economy of the Kuskokwim River area is changing. There is growing interest in commercial harvest, but little is known about the biology and ecology of sockeye salmon in the Kuskokwim River. This project will address this data gap by describing the location, relative abundance, and run-timing of Kuskokwim River sockeye salmon spawning aggregates, describing and comparing habitat utilization and seasonal migration patterns of river-type and lake-type juveniles, describing and comparing smolt size and growth among tributaries and habitat types, and describing the relative importance of river-type versus lake-type sockeye salmon to total production of Kuskokwim River sockeye salmon. Objectives will be achieved by conducting radio tagging studies in 2006-2007, comparing CPUE of juveniles among habitat

types in 2006, and comparing scale circuli and annuli increments as an index of freshwater growth among tributaries and habitat types between 2005-2007. Information gained from the study will address high priority research themes by investigating the structure and abundance of spawning populations and juvenile freshwater habitat use. This information will serve as a foundation for future research, and will be used for sustainable management of Kuskokwim River sockeye salmon.

AYK SSI Project #617

Landscape Genetics of AYK Salmon Populations

Investigator(s): **Jeffrey B. Olsen, U.S. Fish and Wildlife Service, Conservation Genetics Laboratory, Kawerak, Inc., and University of Alaska Anchorage**

Project Period: **July 2006 – June 2008**

AYK SSI Funding: **$213,070**

Proposal Abstract: This study will combine landscape genetics with a comparative analysis of population structure to address the question "what are some of the spatial, environmental, ecological and life history factors influencing genetic, diversity of Chinook, chum, and coho salmon in the watersheds of Norton Sound and the Yukon and Kuskokwim Rivers?". The populations and associated genetic data will be mapped using a Geographic Information Systems (GIS) framework. GIS will be used to measure broad and fine scale environmental (e.g. stream gradient) and ecological (e.g. ecoregion) variables for each population. A combination of statistical methods will be used to evaluate the influence of these variables on the spatial distribution of genetic diversity in each species. A multispecies comparison of these results will be used to infer the extent to which demographic and life history differences among the species influence the distribution of genetic diversity. These analyses will provide insight into how, and at what spatial scale, changes in the environment will impact genetic diversity in each species. A primary product of this study will be a publicly available GIS database of genetic data for spatially-referenced Chinook, chum, and coho salmon populations.

AYK SSI Project #614

Retrospective Analyses of Chum and Coho Salmon

Investigator(s): **Greg Ruggerone, Natural Resources Consultants, Inc., and Alaska Department of Fish and Game**

Project Period: **July 2006 – June 2008**

AYK SSI Funding: **$137,334**

Proposal Abstract: Climate change can have significant effects on salmon growth and survival and the Bering Sea has experienced significant climate shifts in recent decades. Studies have shown that pink salmon can adversely affect growth and survival of sockeye, chum, and Chinook salmon at sea, whereas pink salmon fry can enhance growth and survival of coho salmon smolts. Anecdotal observations by AYK biologists indicate these mechanisms are operating in the AYK region. We will test the hypothesis that climate change and pink salmon have adversely affected growth and abundance of Norton Sound chum salmon, whereas pink salmon have positively influenced growth and abundance of Norton Sound and Kuskokwim coho salmon. These hypotheses will be tested by reconstructing seasonal and annual growth of Norton Sound chum and coho salmon, and Kuskokwim coho salmon from historical collections of scales, 1967-2006. Age composition, catch and escapement of Norton Sound chum salmon will be used to reconstruct Norton Sound chum returns from parent spawning years. These datasets will be compared with climate indices and the alternating-year pattern of AYK pink salmon, which provides a natural experimental control to test the hypotheses. This project addresses several Highest Priority Research Themes identified in the Research and Restoration Plan.

AYK SSI Project #612

Kuskokwim Chinook Salmon Run Reconstruction

Investigator(s): **Douglas B. Molyneaux, Alaska Department of Fish and Game, Commercial Fisheries Division, Bue Consulting LLC, Kuskokwim Native Association, Association of Village Council Presidents, and Alaska Department of Fish and Game**

Project Period: **May 2006 – April 2009**

AYK SSI Funding: **$596,701**

Proposal Abstract: We will reconstruct Kuskokwim River Chinook salmon runs from 1975 through 2007, as a tool to understanding factors affecting salmon production. We will first estimate the number of adult Chinook in the entire Kuskokwim River in 2006 and 2007 by continuing a radio telemetry mark-recapture study that provides estimates of abundance in the middle and upper Kuskokwim River, concurrent with measures to estimate abundance for the Aniak River and lower Kuskokwim tributaries. We will then extend our abundance time series back to 2002 by expanding the 2002 through 2005 radio telemetry estimates to include the entire Kuskokwim River. We will next extend the times series back to 1975 by analyzing escapement data from 1975 through 2007 to create a drainage-wide index of annual escapement, and apply the abundance estimates from 2002 through 2007 as a scalar to estimate annual abundance for each of the indexed years. Finally we will apply historical age composition data to the annual estimates to investigate potential spawner-recruitment relationships as an initial approach to understanding mechanisms that drive variations in abundance.

AYK SSI Project #610

Factors Affecting Juvenile AYK Chum Salmon Growth and Condition

Investigator(s): **Edward V. Farley Jr., NOAA Fisheries, Alaska Fisheries Science Center, Auke Bay Laboratory, and University of Alaska Fairbanks**

Project Period: **May 2006 – April 2009**

AYK SSI Funding: **$673,926**

Proposal Abstract: Mortality during the first year at sea for juvenile salmon (Oncorhynchus spp.) is substantial ranging between 50% and 94% after the first 40 days and greater than 90% during late fall and winter. Marine survival of juvenile salmon is linked to ocean conditions in the estuarine and near shore marine environments through interannual and localized environmental processes affecting juvenile salmon growth. For example, years with favorable environmental conditions in coastal waters lead to increased growth rates of juvenile salmon, thus reducing their susceptibility to size–selective predation and improving survival during their first winter at sea. We will examine the early marine ecology of chum salmon along the eastern Bering Sea shelf. The data sets on ocean conditions and juvenile chum salmon early marine biology come from Bering Aleutian Salmon International Survey (BASIS) research conducted along the eastern Bering Sea shelf during August – October 2002 – 2005. This study will combine prior BASIS data and data collected during 2006 and 2007 BASIS research cruises. Our goal is to assess the effect of biological and physical environmental factors on juvenile chum salmon early marine distribution, migration, growth, and survival. Anticipated products will include: 1) Improved mechanistic knowledge of the impact of climate variability on western Alaska chum salmon populations and ecosystems; 2) Input to a detailed, quality-controlled western Alaska chum salmon dataset; 3) New tools (chum salmon bioenergetic parameters, growth/survival indices) to aid in management of western Alaska salmon resources.

AYK SSI Project #607

Selective Fishery Impacts on Yukon River Chinook Salmon

Investigator(s): **Jeffrey F. Bromaghin, U.S. Fish and Wildlife Service, Fisheries & Ecological Services, Western EcoSystems Technology, Inc., and National Marine Fisheries Service**

Project Period: **July 2006 – June 2008**

AYK SSI Funding: **$183,005**

Proposal Abstract: The Yukon River gillnet fishery may be the only remaining fishery in the world that targets Chinook salmon (Oncorhynchus tshawytscha) with large-mesh gear. Concern regarding potential consequences of the selective removal of large fish is being expressed with increasing frequency among fishery professionals and in public meetings. Investigations attributing changes in population size and structure (i.e., the age, sex, and size composition of a population) to selective fisheries are common in the literature. However, relatively few of these investigations concern salmon, and even fewer consider Alaskan Chinook salmon. Exploratory analyses of data collected during typical harvest sampling or stock assessment activities are hampered by the short time series of available data, as well as high levels of natural variation. In addition, if the decades-old Yukon River Chinook salmon fishery has the capability of modifying population structure, the effects may now be largely manifested and investigations founded on available data, collected only in recent years, may be uninformative. We will evaluate the potential long-term effects of large-mesh gillnet fisheries on Yukon River Chinook salmon by stochastic modeling of population dynamics. Parameters of primary interest include the productivity and age, sex, and size structure of Yukon River Chinook salmon. If results suggest that long-term effects are probable, the resiliency of the population to alternative harvest strategies will be explored.

AYK SSI Project #606

Methods for Setting Escapement Goals in the AYK Region

Investigator(s): **Ray Hilborn, University of Washington, School of Aquatic and Fishery Sciences, and University of Alaska Fairbanks, The University of Montana, Bue Consulting LLC, and Eric Knudsen**

Project Period: **May 2006 – June 2007**

AYK SSI Funding: **$149,217**

Proposal Abstract: The escapement goals and management strategies for salmon stocks in the AYK region have been the subject of considerable controversy yet are critical in the management of these resources. It is widely recognized that there are limitations to the existing methods of creating brood tables and fitting Ricker or other stock-recruitment curves to these data, given the limited information for many AYK systems. In recent years there have been a number of new initiatives for evaluation of escapement goals, including methods that formally incorporate uncertainty and risk, habitat conditions, explicit analysis of life histories, use of data other than brood tables, understanding of stock structure and biocomplexity within watersheds, and evaluation of objectives other than maximum sustained yield. This project will bring together a range of people who have been involved in developing escapement goal methodology for Alaska salmon to (1) evaluate the utility of these new methods for determining escapement goals for AYK stocks, (2) assemble existing data relevant to calculation of AYK escapement goals, (3) apply the new tools to several AYK systems. Given the results of these evaluations, the project will (4) design a statistical/software tool to evaluate alternative escapement goals or management strategies that could be used by all interested parties in the AYK region. This design will (5) lead to a proposal for a future funding cycle of the AYK SSI and possibly the Federal Office of Subsistence Management.

AYK SSI Project #601

Using Local Traditional Knowledge to Understand Long-Term Variability in Norton Sound Salmon Populations

Investigator(s): **Julie Raymond-Yakobian, Kawerak, Inc.**

Project Period: **May 2006 – April 2009**

AYK SSI Funding: **$499,773**

Proposal Abstract: Norton Sound residents have long depended upon the resources of the land and water to support their traditional subsistence lifestyle. Because of their long-term, multi-generational understanding of the region, local residents can often recall short- and long-term changes in harvest opportunities, escapement, colonization, climate change and harvest pressure, as well as other related topics. When these types of events are placed in relation to the milestones of their own lives, local people can attach dates to these stories and, in essence, develop a timeline of change. A multi-dimensional understanding of the ecology of the region, and specifically salmon cycles over time, could be provided by a) recording this knowledge, b) tying it to biological information, and c) placing it into a geographic context. The primary goal of this project is to describe observed changes to the salmon resources and environment in a geographic context so that information can be applied to aid in current fisheries challenges, including fisheries management (i.e. escapement goal development) and freshwater and marine ecosystem research (i.e. climate change). The intent is to augment on-going and new biological research with social science, and through this approach increase the capacity of the local regional Native non-profit organization to become more meaningfully involved in both biological and social research projects.

AYK SSI Project #502

Genetic Variation in Norton Sound Chum Salmon Populations

Investigator(s): **Karen Dunmall, Kawerak, Inc.**

Project Period: **June 2005 – May 2006**

AYK SSI Funding: **$250,635**

Proposal Abstract: Norton Sound has experienced diminished returns of chum salmon for over two decades despite concerted management efforts. Understanding the genetic population structure of these declining chum salmon stocks is critical to designing proper management regimes and conservation efforts. Sound management of any species necessitates knowing how its natural genetic diversity is structured, including any metapopulation dynamics (e.g., straying, homing and dispersal among streams). While various types of traditional research methods (e.g., radio telemetry, tagging, mark-recapture, fish weirs, etc.) can yield valuable information about physical movements of organisms, they cannot determine the true geographic boundaries of populations or detect actual genetic exchange among them. Genetic population structure analysis can be used to define populations (i.e., how they are structured spatially and temporally) and quantify genetic exchange between them. For this project, Kawerak has partnered with Terry Beacham, Department of Fisheries and Oceans (CDFO); John Wenburg, U.S. Fish and Wildlife Service Conservation Genetics Laboratory (CGL); Anthony Gharrett, University of Alaska Fairbanks; Richard Wilmot, National Marine Fisheries Service- Auke Bay; Milo Adkison, University of Alaska Fairbanks; and Charlie Lean, National Park Service. We will use genetic data to define population structure in Norton Sound chum salmon. Genetic data will be used to analyze the metapopulation dynamics. The results of this study will help managers by defining and prioritizing population units for conservation.

AYK SSI Project #501

Use of Otolith Microchemistry to Study Straying and Metapopulation Dynamics in Norton Sound Salmon Populations: Pilot Study to Determine Utility

Investigator(s): **Christian E. Zimmerman, U.S. Geological Survey, Alaska Science Center, Alaska Department of Fish and Game, and Oregon State University**

Project Period: **May 2005 – December 2007**

AYK SSI Funding: **$72,665**

Proposal Abstract: Understanding the metapopulation dynamics of salmon populations in Norton Sound requires a better understanding of straying, homing, and dispersal among streams. Because direct methods to measure straying, such as tagging juveniles and observing adult spawning populations for tag recaptures are not logistically feasible or impossible due to the small size of juveniles (in the case of chum and pink salmon), we will test methods of detecting natural elemental and strontium isotope tags in the otoliths (or earstones) of salmon. Given the geologic heterogeneity among streams within Norton Sound, it is likely that elemental and strontium isotope signatures in otoliths will vary among streams and provide a means of identifying stream of origin. If the technique is feasible, future studies will be able to sample adult spawning populations to determine rates of natal stream homing and straying. We will collect juvenile chum and coho salmon from the Nome, Niukluk, Fish, North, and Chiroskey Rivers and quantify elemental and strontium isotope signatures within otoliths to determine if signatures are distinct enough to warrant use as a natural tag.

AYK SSI Project #439

Development and Application of a Salmon Habitat Restoration Framework on the Nome River Watershed

Investigator(s): **Karen Dunmall, Kawerak, Inc., and LGL Alaska Research Associates, Inc.**

Project Period: **May 2004 – April 2005**

AYK SSI Funding: **$139,159**

Proposal Abstract: We will develop and test a salmon habitat restoration framework that will identify cost-effective treatment strategies and designs for western Alaska streams. The framework will be tested on the Nome River, thereby serving the dual purpose of helping to restore a specific stream while identifying which aspects of restoration frameworks developed and applied elsewhere in North America may transfer to western Alaska. The work will consist of the following three components: (1) an overview watershed assessment to identify priority subbasins and reaches in relation to their importance to target fish species, probable critical limiting factors and potential for restoration success, (2) detailed habitat assessments on priority reaches to identify habitat condition, type and severity of impact and opportunities for restoration, and (3) designs for specific treatments or structures that address the restoration of watershed processes and critical habitats. Detailed assessment work and restoration designs will be undertaken on prioritized subbasins and stream reaches within the Nome River. This river was selected because of apparent historic impacts from both mining and road construction, ease of access, and existing information on both adult salmon returns (weir project) and juvenile salmon distribution (current study of coho salmon). The expected product will be specific prescriptions for habitat restoration on the Nome River and an extensive assessment for applying the methods to other western Alaska streams.

AYK SSI Project #436

Clear Creek Chum Salmon Ecology Studies: Development of a Habitat-based Method to Assess Summer Chum Salmon Spawning Habitat Quality and Location

Investigator(s): **James E. Finn, U.S. Geological Survey, Alaska Science Center, and Bureau of Land Management**

Project Period: **May 2004 – April 2005**

AYK SSI Funding: **$97,445**

Proposal Abstract: As much of the interpretation of escapement data used for Yukon River and western Alaska salmon management decisions is made in light the current state of knowledge concerning basic salmon life history, there is a critical need for long term research on salmon ecology and quantitative evaluation of environmental factors affecting the production cycle. We will begin the development of stream-channel/drainage-wide methods to evaluate the quality and distribution of chum salmon spawning and incubation habitat. Our aim is to move toward a method that could be applied over a broad geographic range in the AYK area. Research has documented critical nature of inter-gravel conditions, the physical mechanisms that maintain inter-gravel flow patterns, the extreme variation in spawning and incubating habitat quality, and the potential effects on successful reproduction and hence freshwater production of AYK chum salmon. However, studies have been limited to discrete sites and required intensive efforts in terms of time and manpower. One of the next logical steps would be to applying this knowledge to develop methods that can be applied at a larger scale and using more general (i.e., easier to obtain data). The current efforts at Clear Creek, Hogatza River drainage, by USGS, BLM, and YRDFA provide an almost unique opportunity to make this step. The development of a geo-referenced map and database would provide a tool for assessing future changes (both negative and positive) in restoration, management, climate, and development regimes.

AYK SSI Project #430

Abundance Estimation and Distribution of Chum Salmon in the Unalakleet River Drainage Using Radio Telemetry and Mark Recapture Methodologies

Investigator(s): **Gary Todd, Alaska Department of Fish and Game, Commercial Fisheries Division, and Unalakleet IRA**

Project Period: **May 2004 – June 2005**

AYK SSI Funding: **$153,346**

Proposal Abstract: Applicants will use radiotelemetry techniques and mark-recapture methodology to estimate total abundance, stock composition, run timing, migration characteristics, and spawning distribution of chum salmon in the Unalakleet River drainage. The North River tower (a tributary river) is currently used to enumerate salmon escapements in that drainage. From other studies, it has been found to be a good index of abundance of Chinook salmon in the Unalakleet River. This study will assess whether chum salmon counts at North River tower can be used to estimate the Unalakleet River drainage population, and if the majority of chum salmon migrate and spawn past a proposed weir location upriver in the Unalakleet River.

AYK SSI Project #426

Estimation of Summer Chum Salmon Distribution in the Yukon River Drainage Using Radio Telemetry

Investigator(s): **Ted Spencer, Alaska Department of Fish and Game, Commercial Fisheries Division, and National Marine Fisheries Service**

Project Period: **May 2004 – April 2005**

AYK SSI Funding: **$93,850**

Proposal Abstract: Applicants will use radio telemetry techniques to estimate run timing, movement patterns, and spawning distribution of summer chum salmon in the Yukon River. Specifically, this study will provide migratory characteristics and escapement distribution of summer chum salmon among major Yukon River tributaries, with particular emphasis on what proportion of tagged summer chum salmon go to the Anvik River, the Tanana River, and other tributaries.

AYK SSI Project #425

Effective Population Size of Chinook Salmon from the Yukon and Kuskokwim Rivers

Investigator(s): **Jeffrey B. Olsen, U.S. Fish and Wildlife Service, Conservation Genetics Laboratory**

Project Period: **May 2004 – April 2005**

AYK SSI Funding: **$56,410**

Proposal Abstract: Presently, no estimates of effective population size (Ne) are available for Chinook salmon in the AYK region. Estimates of Ne are important for interpreting the health and viability of small or declining populations. Estimates of Ne can also play a central role in identifying and prioritizing populations for restoration and for evaluating escapement goals. This project will use both demographic and genetic data to estimate and evaluate the Ne of Chinook salmon from the Kwethluk, Tuluksak, Gisasa and Tozitna rivers. These estimates of Ne will be compared to theoretical

threshold values for conservation, to values reported for other Chinook salmon populations, and to the biological escapement goals for these populations. This work will be conducted in 2004 and 2005 at USFWS Conservation Genetics Laboratory (CGL) using archived samples from the four populations. The primary product will be a final report submitted to the AYK SSI Scientific Technical Committee.

AYK SSI Project #424

Body Condition and Feeding Ecology of Kuskokwim River Chum Salmon Fry During Freshwater Outmigration

Investigator(s): **Christian E. Zimmerman, U.S. Geological Survey, Alaska Science Center**

Project Period: **May 2004 – April 2005**

Proposal Abstract: The marine environment has been identified as the primary influence to salmon survival, however, freshwater and estuarine habitat use during early life history are also considered critical stages influencing ocean survival. Research on the freshwater early life history of chum salmon in the Kuskokwim watershed is currently nonexistent. We will explore capture methods of under-ice sampling before and during spring break-up to evaluate ways to estimate outmigration timing of chum salmon fry in the Kuskokwim watershed. Spawning populations of summer chum salmon have been documented at over 900 km in the Kuskokwim drainage, as well as populations spawning close to the ocean. Investigations into the feeding ecology and energy reserves of chum salmon fry originating from the upper Kuskokwim River (> 900 km from estuary) and the Kwethluk River (< 200 km from estuary) may help scientists gain an understanding of the factors relating to migration distance that can influence survival during the smolt transition from freshwater to estuarine life history stages.

AYK SSI Project #416

Estimation of Coho Salmon Abundance and Spawning Distribution in the Unalakleet River

Investigator(s): **Audra Brase, Alaska Department of Fish and Game, Sport Fish Division**

Project Period: **May 2004 – April 2005**

AYK SSI Funding: **$75,300**

Proposal Abstract: The Unalakleet River supports the largest population of coho salmon in Norton Sound. These fish are utilized by subsistence, commercial and recreational users. Little is known about the distribution of coho salmon throughout the Unalakleet River drainage. A counting tower is operated on the North River, however is it unknown if the number of coho salmon counted past the tower is an accurate index to the overall Unalakleet River escapement. Aerial surveys to enumerate Unalakleet River coho salmon are often ineffective due to poor weather conditions during the peak of spawning. This study will utilize radiotelemetry techniques to: 1) estimate the proportions of the coho salmon escapement migrating up the mainstem Unalakleet, North, Chirosky, and Old Woman rivers, and the North Fork of the Unalakleet River; and 2) estimate the abundance of coho salmon escaping into the Unalakleet River drainage by proportional expansion of the North River tower count estimate. Coho salmon will be captured from August through September with drift and/or set gillnets in the Unalakleet River. Approximately 200 coho salmon will be tagged with esophageal radio tag transmitters. Radio-tagged fish will be tracked using three stationary stations and multiple aerial surveys.

AYK SSI Project #414

Capacity Development and Community Involvement through the Collection of Subsistence Fisheries Harvest Data

Investigator(s): **Kimberly Elkin, Tanana Chiefs Conference, and Bering Sea Fishermen's Association**

Project Period: **May 2004 – May 2005**

AYK SSI Funding: **$74,915**

Proposal Abstract: This project will focus on community involvement by hiring youth from 10 villages to collect biological data. Training youth to collect subsistence harvest data will provide an opportunity to build capacity in each community. Existing subsistence fisheries harvest data doesn't allow for characterizing harvests and providing additional biological data concerning chinook and chum salmon. Data will be used to generate information on genetic stock identification, diseases such as Ichthyophonus, and age, sex, and length distributions.

AYK SSI Project #410

Retrospective Analysis of AYK Chinook Salmon Growth in Freshwater and Marine Habitats, 1964-2004

Investigator(s): **Jennifer Nielsen, U.S. Geological Survey, Alaska Biological Science Center, Natural Resources Consultants, Inc., and Alaska Department of Fish and Game**

Project Period: **September 2004 – September 2005**

AYK SSI Funding: **$124,438**

Proposal Abstract: Salmon populations in the Yukon and Kuskokwim rivers have undergone significant shifts in abundance during the past 40 years, yet little is known about the factors influencing these shifts. Growth is often an important determinant of salmon survival. We will measure annual and seasonal growth of Yukon River and Kuskokwim River Chinook salmon in freshwater and marine habitats during the past 41 years (1964-2004) using the historical collection of scales, which are correlated with salmon body size. Annual scale growth will be compared with harvest levels, environmental factors in marine habitats (e.g., sea surface temperature, 1976/77 ocean regime shift, 1997 El Nino) and freshwater habitats (air temperature, river flow), and with potential competitors such as Kamchatka pink salmon. Recent studies with Bristol Bay sockeye salmon and Puget Sound Chinook salmon suggest that the proposed methodology and analyses will provide important new information on factors affecting growth and survival of AYK Chinook salmon.

AYK SSI Project #409

Characteristics of Fall Chum Salmon in the Kuskokwim River Drainage

Investigator(s): **Sara Gilk, Alaska Department of Fish and Game, Commercial Fisheries Division**

Project Period: **May 2004 – April 2005**

AYK SSI Funding: **$72,787**

Proposal Abstract: Managing for sustainable salmon fisheries in the Kuskokwim River is challenging, due in part to the lack of stock-specific abundance and run-timing information. This data gap is most pronounced for fall chum salmon, which local residents have long recognized and utilized for subsistence. Fisheries managers, however, have only recently recognized their existence. This project will: 1) describe the distribution, morphology, and biology of adult fall chum salmon in comparison to summer chum salmon; 2) describe the run-timing of adult fall chum salmon in the lower Kuskokwim River; and 3) determine the relative abundance of adult fall chum salmon in the Kuskokwim River. Project objectives will be achieved by utilizing historical data, local traditional knowledge, and by capitalizing on existing project platforms. Results from this project will serve as a basis for developing sustainable management practices for this unique population aggregate.

AYK SSI Project #406

Non-Lethal Estimation of Energy Content of Yukon River Chinook Salmon

Investigator(s): **F. Joseph Margraf, University of Alaska Fairbanks, Alaska Cooperative Fish and Wildlife Research Unit**

Project Period: **May 2004 – May 2005**

AYK SSI Funding: **$20,952**

Proposal Abstract: Because of the importance of Chinook salmon to commercial and subsistence fisheries on the Yukon River, further study of the factors that may affect the success of this species and our ability to manage the fisheries is warranted. Critical to these studies is the determination of the amount of lipids (fat) stored and available to the fish as its primary energy source for migration and spawning. Recent developments of Bioelectrical Impedance Analysis (BIA) promise a simple, non-lethal means of estimating proximate composition for field applications with fish. The project goal is to develop BIA models for Chinook salmon from the Yukon River watershed that will permit the non-lethal estimation of body proximate composition (e.g. fat, protein, water content) for use in field studies.

AYK SSI Project #405

Review of Experimental Design Principles for Projects to Restore AYK Salmon

Investigator(s): **Randall M. Peterman, Simon Fraser University**

Project Period: **May 2004 – May 2005**

AYK SSI Funding: **$12,690**

Proposal Abstract: Only some of the well-intentioned projects that aim to restore former high abundances of AYK salmon stocks will succeed. Such projects are vulnerable to unexpected outcomes, as are all management actions. Restoration projects should therefore be designed so that their effectiveness can be evaluated easily at some future date. This requires that the projects utilize principles of experimental design. We will review literature on experimental designs in applied ecology and develop a framework that applies those concepts to restoration projects for salmon in the AYK region. Using the resulting framework of experimental design, proponents of projects can then design better restoration activities and the AYK Scientific and Technical Committee can evaluate proposed restoration projects based on the ability to clearly determine the projects' effectiveness.

AYK SSI Project #401

Patterns and Trends in Subsistence Salmon Harvests, Norton Sound, 1994-2003

Investigator(s): **James Magdanz, Alaska Department of Fish and Game, Division of Subsistence, and Kawerak, Inc.**

Project Period: **May 2004 – April 2005**

AYK SSI Funding: **$107,221**

Proposal Abstract: Using harvest data from the northwest salmon survey project, this project will explore patterns and trends in subsistence salmon harvests at the household level during the past ten years in ten communities in the Norton Sound – Port Clarence Area. Researchers will retrieve the archived annual survey data files, translate them into a common data format readable by Microsoft Access and SPSS, and then aggregate the ten annual data sets into a single household-level database. Researchers will verify household identifiers and gather additional information on household characteristics, which would be added to the database. Using this database, researchers will explore patterns of salmon harvests at the household level. In particular, researchers will stratify households and explore trends in salmon harvests among groups of similar households. Previous research has shown stratification of households improves confidence in models of subsistence production.

AYK SSI Project #314

Estimation of Abundance and Distribution of Chinook Salmon in the Yukon River Using Radio Telemetry and Mark Recapture Techniques

Investigator(s): **Ted Spencer, Alaska Department of Fish and Game, Commercial Fisheries Division, and National Marine Fisheries Service**

Project Period: **May 2003 – April 2004**

AYK SSI Funding: **$209,137**

Proposal Abstract: We will use radio telemetry techniques and a mark-recapture model to estimate total abundance, stock composition, run timing, migration characteristics, and spawning distribution of Chinook salmon in the Yukon River. The Alaska Department of Fish and Game (ADFG) and the National Marine Fisheries Service (NMFS) began this project as a feasibility study in 2000 and 2001 to address technical aspects and logistical considerations associated with a large-scale basinwide telemetry program. A full scale, basinwide radio tagging and monitoring program was conducted in 2002 that included a significant element independently funded and operated in the Canadian portion of the drainage. This proposal represents a continuation of the 2002 program for an additional year in the absence of federal fishery disaster relief or treaty implementation funding.

AYK SSI Project #310

Population Estimate of Kuskokwim River Chum, Sockeye and Coho Salmon

Investigator: **Carol Kerkvliet, Alaska Department of Fish and Game, Commercial Fisheries Division, and Kuskokwim Native Association**

Project period: **April 2003 – April 2004**

AYK SSI funding: **$198,217**

Proposal Abstract: This project is designed to estimate the total abundance of chum, sockeye, and coho salmon in the Kuskokwim River upstream from Kalskag using mark-recapture techniques. Fish wheels and drift gillnets will capture salmon at locations near Kalskag and just below Aniak. Marked fish will receive a primary spaghetti tag and a secondary mark. Other biological data will be collected (length, sex, and subsample for age) from each tagged fish. Weirs on upriver tributaries (George river, Takotna river, Tatlawiksuk river, and Kogrukluk river) will be used to recover marked salmon. This mark-recapture project began in 2001 with coho salmon and was expanded in 2002 to include chum and sockeye salmon and will continue a time series of abundance estimates to assess the state of salmon stocks, provide inseason abundance estimates for chum

salmon, and establish run timing for specific stocks past the release site for use in fishery management decisions.

AYK SSI Project #309

Kuskokwim Area Subsistence Salmon Harvest Surveys

Investigator(s): **Michael W. Coffing, Alaska Department of Fish and Game, Division of Subsistence, and Kuskokwim Native Association**

Project Period: **April 2003 – June 2004**

AYK SSI Funding: **$104,639**

Proposal Abstract: Quantitative and qualitative information will be collected through household surveys after subsistence salmon fishing is over (October and November). This information will include: household harvest amounts for Chinook, chum, sockeye and coho salmon; gear types used, gill-net mesh sizes used for harvesting Chinook salmon; the number of salmon harvested with hook and line gear; the number and species of salmon harvested for dog food; and qualitative information that will characterize the subsistence fishery for each of the four salmon species harvested. Subsistence salmon harvest calendars will also be provided to subsistence fishers to use for recording their daily salmon harvests. The results of the surveys will be summarized in the 2003 Kuskokwim Area Annual Management Report and will include tables summarizing community harvests, gear types, participation rates, and a qualitative assessment of the subsistence salmon fishery. The project will be based in Bethel with the data management component in the Anchorage ADFG office.

AYK SSI Project #306

Satellite-derived Multivariate Database for Evaluating Environmental Influence on AYK Salmon

Investigator: **Jan Svejkovsky, Ocean Imaging Corporation**

Project Period: **May 2003 – April 2004**

AYK SSI Funding: **$76,293**

Proposal Abstract: This project will produce a novel oceanographic data base of the Eastern Bering Sea spanning the years 1987 – present. Imagery from multiple satellite sensors will be used to characterize the region's sea surface temperature, suspended sediment and plankton patterns at 1km spatial resolution on daily, weekly and monthly frequencies. Specialized algorithms will be applied to AVHRR visible data to bridge the important ocean color data gap existing between 1987 and late 1997 when no dedicated ocean color sensor was available. The time series will be analyzed for pattern changes, anomalies and trends, and these data will be correlated to salmon abundance measurements, on both basin-wide and watershed-specific spatial scales.

AYK SSI Project #303

Uncertainty Analysis for Western Alaska Chum Salmon Biological Escapement Goals

Investigator: **Daniel Goodman, The University of Montana**

Project Period: **June 2003 – May 2004**

AYK SSI Funding: **$35, 000**

Proposal Abstract: This project will follow through on one of the recommendations of the 2001 Mundy Committee report: that the statistical analyses used for arriving at BEGs be subjected to a formal uncertainty analysis, to quantify the possible magnitude of the error and to explore possible consequences of that error for the ecosystem and long term harvest potential. The statistical analysis will be carried out on the ADFG stock recruit data for the Kwiniuk, Andreafsky, Norton Sound District One, Yukon Fall, and Anvik runs. The uncertainty will be analyzed with respect to the form of the stock recruitment curve and temporal changes in productivity (regime). Further factors to be considered will be counting error and feedback of marine derived nutrients on productivity.

AYK SSI Project #301

Kuskokwim, Yukon and Kotzebue Data Rescue, Correction and Standardization

Investigator(s): **Seth Darr, Alaska Department of Fish and Game, Commercial Fisheries Division**

Project Period: **July 2003 – March 2004**

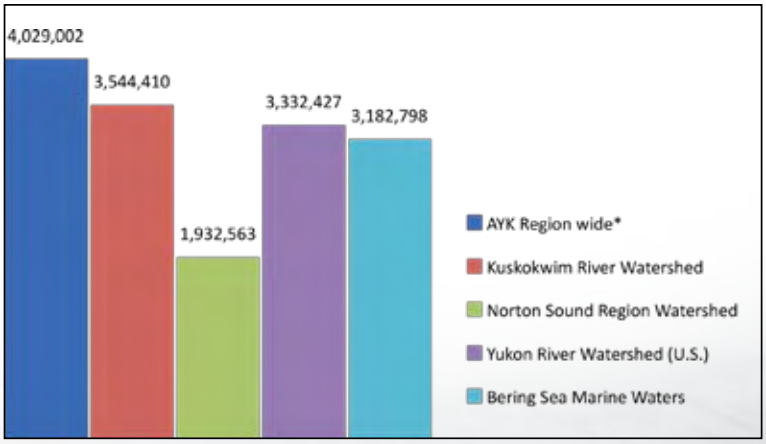
AYK SSI Funding: **$15,000**

Proposal Abstract: The objective of this project is to aggregate, error-check and correct historical ASL data in the AYK region, and to standardize data formats for inclusion into a centralized database, with special emphasis on rescuing historical ASL data of Chinook, sockeye, and coho salmon from archival OPSCAN sheets, to provide managers, researchers and public entities involved in fisheries in the AYK Region, a system to enter and process new data as well as retrieve historic data. This is a continuing part of the AYK region database construction project that has received funding from FOSM, NOAA and the Norton Sound Disaster. This proposal covers retrieval of data that are not covered by other funding sources.

The AYK SSI was appropriated $20,500,000 in order to assemble existing information, gain new information, and improve techniques for understanding the trends and causes of variation in salmon abundance and human use of salmon.

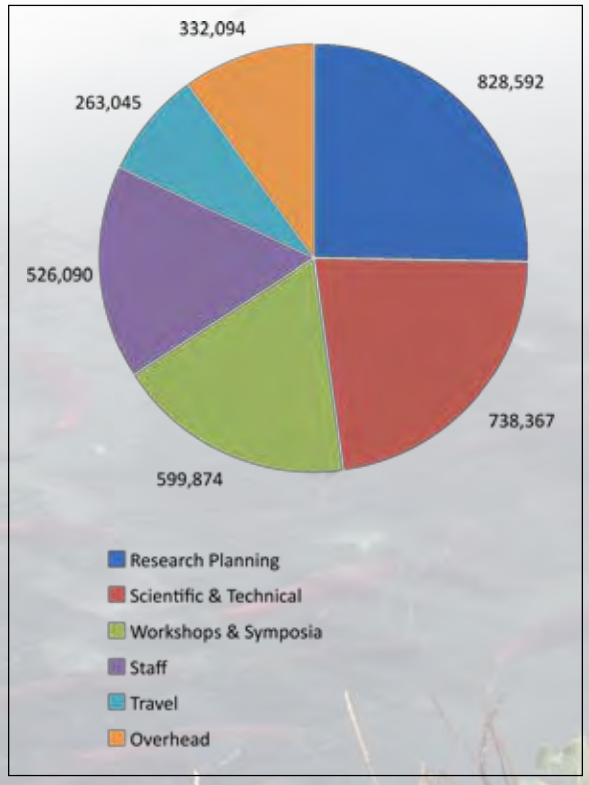
The Steering Committee has obligated 100% of the funds (this includes projections through 2011) passed through to the Initiative; just over $19,300,000 (this number does not include the ADFG indirect or the NOAA reductions which are both used for administration). Funds were directed to the Research and Restoration Plan Frameworks (Salmon Life Cycle, Human Systems, Synthesis and Prediction), broad capacity building efforts, and the administration of the Initiative. We provide the following charts to show how funds have been distributed.

AYK SSI Projects Distributed by Region

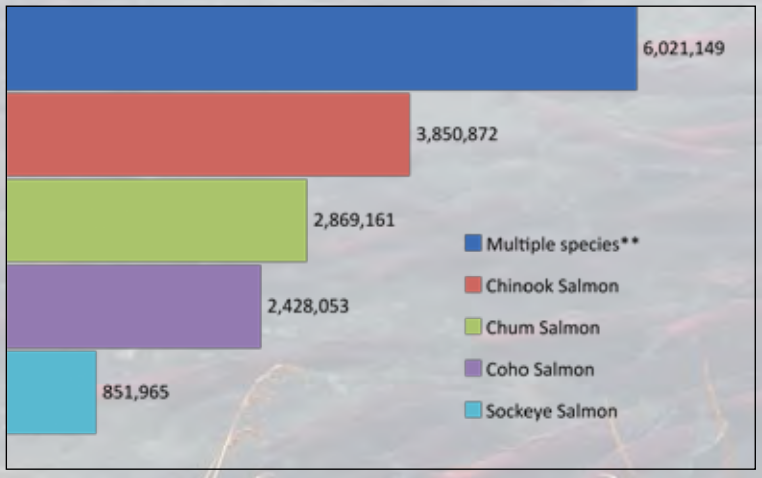


** AYK Region wide designation includes projects directed at all regions.*

AYK SSI Non-Project Based Spending



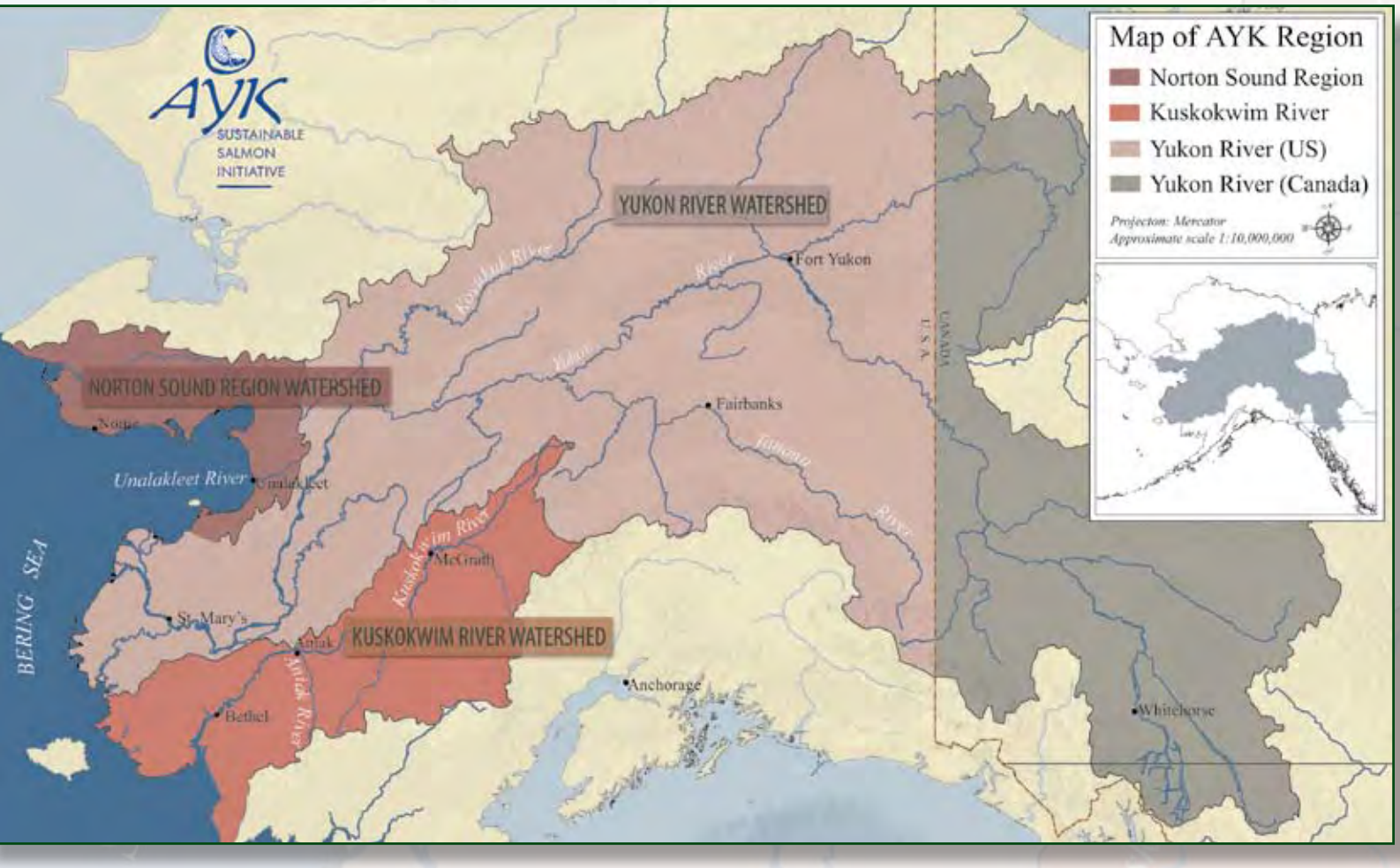
AYK SSI Projects Distributed Across Species



*** Multiple-species includes projects which are designed to study at least two different salmon stocks.*

Geographic Distributions of Funded Projects

Since its inception the AYK SSI has funded 53 salmon research projects addressing salmon research needs across the region. Beginning in 2006, research priorities were drawn from the AYK SSI Research and Restoration Plan (RRP), which serves as the science-based roadmap guiding the Initiative's "Invitations to Submit Research Proposals" and ensuring that available funds target the highest priority research questions and issues.



Our fifty-three projects are broken down into the areas addressed among the four sub-regions: Norton Sound Area, Yukon River Watershed, Kuskokwim River Watershed, the Bering Sea, plus a set of AYK SSI region wide projects. Projects were assigned to sub-regions based on the principle focus of the project objectives and methods. Tangential references to other watersheds were not sufficient reason to add a project to a second sub-region.

In light of the broad range of priorities addressed over the past six years, it is significant that the figure at right shows a fairly even distribution of projects among the four sub-regions. Thirteen projects are focused in the Norton Sound Area, eleven in the Yukon River Watershed and twelve in the Kuskokwim River Watershed. The Bering Sea ecosystem is the focus of eight projects and another nine projects address topics of region-wide significance.

KUSKOKWIM RIVER WATERSHED PROJECTS

Project #	Principal Investigator	Project Title
309	Coffing	Kuskokwim Area Subsistence Salmon Harvest Surveys
810	Crane	Kuskokwim River Coho Genetics
409	Gilk	Fall Chum Salmon in the Kuskokwim River Drainage
618	Gilk	Kuskokwim Sockeye Salmon Investigations
310	Kerkvliet	Population Estimates of Kuskokwim River Salmon
802	McPhee	Ecotypic Variation in AYK Sockeye Stocks
612	Molyneaux	Kuskokwim Chinook Salmon Run Reconstruction
801	Molyneaux	Kuskokwim Coho Salmon Investigations
725	Olsen	Heritability of Traits in Wild Chinook
805	Ruggerone	Productivity of Kuskokwim Juvenile Coho
424	Zimmerman	Body Condition and Feeding Ecology of Kuskokwim Chum Salmon Fry
619	Zimmerman	Juvenile Salmon Migration, Kwethluk River, Alaska

AYK REGION-WIDE PROJECTS

Project #	Principal Investigator	Project Title
708	Collie	Risk Assessment Framework for AYK Salmon
301	Darr	Kuskokwim, Yukon, and Kotzebue Data Rescue
303	Goodman	Uncertainty Analysis for Western Alaska Chum Begs
606	Hilborn	Methods for Escapement Goals in the AYK Region
425	Olsen	Population Size of Chinook Salmon from AYK Rivers
617	Olsen	Landscape Genetics of AYK Salmon Populations
714	Overland	Future Climate/Habitat of AYK Ecosystems
405	Peterman	Review of Design Principals to Restore AYK Salmon
735	Schroeder	Alaska Native Science & Engineering Program

BERING SEA - MARINE PROJECTS

Project #	Principal Investigator	Project Title
809	Agler	Historical Analyses of AYK and Asian Chum
610	Farley	Juvenile AYK Chum Salmon Growth and Condition
719	Kondzela	Analysis of Immature Bering Sea Chum
712	Myers	Climate-Ocean Effects on Chinook Salmon
410	Nielsen	Retrospective Analysis of AYK Chinook Growth
306	Svejkovsky	Satellite-Derived Environmental Database
632	Templin	Stock-Specific forecast of AYK Chinook Salmon
711	Weingartner	Juvenile Salmon Dispersal: Drifter Based

NORTON SOUND AREA PROJECTS

Project #	Principal Investigator	Project Title
416	Brase	Coho Salmon Abundance in the Unalakleet River
803	Burnett	Landscape Predictors of Coho Salmon
439	Dunmall	Salmon Habitat Restoration on the Nome River
502	Dunmall	Genetic Variation in Norton Sound Chum
721	Lean	Nome River Coho Salmon Abundance and Survival
804	Lean	Testing Production Models in the Fish River
401	Magdanz	Subsistence Salmon Harvests 1994-2003 Norton Sound
601	Raymond-Yakobian	Using LTK to Understand Long-Term Variability In N.S. Salmon
614	Ruggerone	Retrospective Analyses of Chum and Coho Salmon
807	Ruggerone	Norton Sound Chinook Growth and Production
731	Smoker	Seward Peninsula Sockeye Smolt Studies
430	Todd	Chum Salmon in the Unalakleet River Drainage
501	Zimmerman	Otolith Microchemistry Norton Sound Salmon

YUKON RIVER WATERSHED PROJECTS

Project #	Principal Investigator	Project Title
724	Borba	Fall Chum Distribution in Upper Tanana
607	Bromaghin	Selective Fishery Impacts on Yukon River Chinook
806	Bromaghin	Fecundity of Yukon River Chinook Salmon
414	Elkin	Community Based Collection of Fishery Data
436	Finn	Habitat-Based Method to Assess Summer Chum Salmon
406	Margraf	Energy Content of Yukon River Chinook Salmon
622	Moncrieff	Indicators of Salmon Run Abundance and Timing
314	Spencer	Telemetry and Mark Recapture for Yukon River Chinook
426	Spencer	Summer Chum Salmon Distribution in the Yukon River
702	Wipfli	Ecology and Demographics of Chinook
808	Zuray	Rapids Student Data Collection

Contact Info

www.AYKSSI.org
Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative
110 W. 15th Ave, Unit A • Anchorage, Alaska 99501
(907) 279-6519 phone • (888) 927-2732 toll free
(907) 258-6688 fax • e-mail: karen.gillis@bsfaak.org

Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative
Bering Sea Fishermen's Association
110 W. 15th Ave, Unit A
Anchorage, Alaska 99501

PRESORTED
STANDARD
US POSTAGE
PAID
ANCHORAGE, AK
PERMIT #537

A-Y-K Sustainable Salmon Initiative
Memorandum of Understanding

I. Introduction

Salmon returns to western Alaska have been in decline for more than a decade, and the pace of decline has accelerated in recent years. Poor returns of Chinook and chum salmon to the Yukon River, Kuskokwim River, and rivers draining into Norton Sound, (collectively known as the AYK Region) have led to severe restrictions on commercial and subsistence fisheries and to repeated disaster declarations by the state and federal governments. The commercial Chinook harvest on the Yukon River in 2000 was less than 10% of the historical long-term average. The 2000 season followed similar low returns and disaster declarations in 1998 and 1993, and particular salmon run failures in various western Alaska locations throughout the 1990s. In the Norton Sound region, some commercial fisheries have been closed for a decade, and many subsistence fisheries been restricted or closed.

This Memorandum of Understanding has grown from a unique collaboration among regional Alaska Native organizations and the Alaska Department of Fish and Game. The concept of forming a body to provide direction to response efforts for the salmon failures in western Alaska developed through discussions between the Alaska Department of Fish and Game and the "A-Y-K Coalition". The A-Y-K coalition is comprised of three Alaska Native organizations providing services to over 100 federally recognized Alaska Native Tribes in the AYK region: the Association of Village Council Presidents, the Tanana Chiefs Conference, and Kawerak, Inc. Also included in the coalition is the Bering Sea Fisherman's Association, a non-profit organization that has been active in AYK fisheries issues, including research, for decades. Common concerns over recent drastic declines in salmon returns coalesced into an action plan at a meeting of the parties on June 8, 2001 in Anchorage, Alaska. The culmination of the action plan is this A-Y-K Sustainable Salmon Initiative Memorandum of Understanding (hereinafter referred to as AYK-SS- MOU).

II. Purpose

The purpose of the AYK-SS- MOU is to provide a mechanism for its signatories to engage in a collaborative effort to develop and implement a comprehensive research plan for the A-Y-K region utilizing the $5 million appropriated for this initiative by Congress for federal fiscal year 2002 (Pacific Coastal Salmon Recovery Fund), and any other funds appropriated or otherwise dedicated to this initiative. The two committees formed by the AYK-SS-MOU will develop and implement the A-Y-K Salmon Research and Restoration Plan (hereinafter referred to as the Research and Restoration Plan).

III. Guiding Principles

- Funds available for A-Y-K salmon research and restoration should be spent in a manner to obtain the greatest good for the fisheries and users in the A-Y-K area and the ecosystems upon which they depend. This includes the use of traditional and cultural knowledge, participatory research, and capacity building. The A-Y-K region for the purpose of this MOU encompasses the service delivery areas of Kawerak, Association of Village Council Presidents, Tanana Chiefs Conference and the near and off shore areas of river drainages flowing into, the Bering Sea north of Cape Newenham and south of Shishmaref.

- To maximize the use of available funds, they shall be used to the degree possible and consistent with this MOU, in coordination with other fishery agencies, funding sources and plans. Other agencies include the U.S. Geological Survey, Yukon River Drainage Fisheries Association, National Park Service, the Bureau of Land Management, the Council of Athabascan Tribal Governments, U.S./Canada Yukon River Joint Technical Committee, the North Pacific Research Board, the North Pacific Anadromous Fisheries Commission, and the Gulf Ecosystem Monitoring program. Collaborative research jointly funded with such entities should be undertaken to the maximum extent practicable.

  <u>The intent of this MOU is not to duplicate past or existing research but to add to current expenditures in the A-Y-K area for fishery research. Thus, it is the intent that funds administered under the MOU not be viewed as a source to replace funding for research and management projects that were ongoing at the time this MOU was entered into or were undertaken after the MOU was in place without the involvement of or funding by the AYK-SSI. It is particularly important that the funds administered pursuant to this MOU not be viewed by agencies and organizations as a means to shift budget priorities to other issues while relying on AYK-SSI funds as replacement funds for conducting long-standing, routine, in-season fishery management projects in the AYK. There may be cases, however, where a funding source is no longer available for an ongoing research or management project the continuation of which is important to fulfilling the goals of this MOU. It is therefore the intent of this MOU that a party seeking replacement funds for an ongoing research or management project demonstrate to the Steering Committee that prior funding sources for the project are no longer available in sufficient amounts to conduct the project and the reasons why such funding sources are no longer available and that; 1) the project clearly satisfies the requirements and objectives of this MOU and the Research and Restoration Plan once adopted; 2) the agency or organization seeking replacement funding for a current project is contributing the maximum amount (either in money or in-kind contributions or both) that it can reasonably make available to the project taking into consideration its funding sources and other responsibilities; and 3) the agency or organization seeking replacement funding has in good faith sought funding for the project from other reasonably available sources. Moreover, the Signatories to this agreement agree to continue to</u>

actively seek other funds to undertake necessary fishery research regarding A-Y-K salmon and shall make an annual report to the parties of this agreement of such efforts.

- Available funds shall be used for research and restoration consistent with the Research & Restoration Plan for A-Y-K salmon stocks developed through the Scientific Technical Committee Steering Committee process described below.

- Development of the Research & Restoration plan shall take into account existing research plans of the region and shall be based upon recommendations forwarded by a Scientific Technical Committee (STC) of disciplinary experts. The STC shall be composed of members that represent relevant scientific disciplines. STC members will exercise, to the greatest degree possible, their independent judgment about research and restoration needs and priorities. The Research and Restoration Plan shall be a comprehensive plan that identifies research needs and priorities including freshwater, near shore and marine phases of AYK salmon stocks.

- Decisions regarding adopting and implementing the Research and Restoration Plan, shall be made by an eight member Steering Committee composed of regional, state and federal representatives. The Steering Committee shall make its final decisions only after reviewing comments and recommendations made by the public and the Scientific Technical Committee on preliminary decisions. The Steering Committee shall allow adequate time and resources to ensure the spirit of this initiative and an open process.

- The Research and Restoration Plan will go beyond providing a single, static prescription of research activities. Instead, it will provide an ongoing process whereby research activities are guided, selected, reviewed and modified over time to reflect the outcome and knowledge obtained from research and restoration activities.

IV. Steering Committee

1. Membership

The Steering Committee membership will consist of eight members selected by the following agencies or organizations (one member each except ADF&G: one biologist, one social scientist from the Subsistence Division):

Association of Village Council Presidents
Kawerak, Inc.
Tanana Chiefs Conference
Alaska Department of Fish and Game
U.S. Fish and Wildlife Service
National Marine Fisheries Service
Bering Sea Fishermen's Association

Once the initial members are appointed, the Steering Committee shall adopt bylaws that will govern the appointment or election and term of the Chairperson, quorums, appointment of alternates, and other matters necessary for governing the Steering Committee.

2. Steering Committee Decision-Making Process

A consensus decision making process will be used by the Steering Committee. A separate, non-voting Scientific Technical Committee (STC) shall make recommendations to the Steering Committee. The formations and responsibilities of the STC are detailed in Section 5 below.

3. Steering Committee Responsibilities

The Steering Committee shall adopt a Research and Restoration Plan for the A-Y-K salmon fisheries after considering the recommendations of the STC. The Steering Committee shall:

- Make decisions on how available funding shall be expended. In making decisions to expend funds for research or management projects prior to adoption of the AYK Research and Restoration Plan, the Steering Committee shall, after considering the recommendation of the STC, base such decisions on which projects will provide the most benefit to the fisheries and users in the A-Y-K area and the ecosystems upon which they depend.

- Exercise its authority by deciding the scope, timing, amount and other necessary elements for all grants or other applications necessary to secure appropriated funds, and any modifications thereto. Projects authorized by the Steering Committee shall further specify research and restoration goals of the approved plan. The Steering Committee shall formally review and approve any proposal and any amendment thereto prior to submittal to the funding source.

.

- Have all necessary authority to solicit projects, work with scientific or other experts, identify and prioritize projects for funding, review project results, and ensure data and results are freely available to the public.

- Require the timely completion of projects and facilitate the communication of research results to other interested agencies and individuals annually.

- Appoint six STC members from nominations from the signatories and other interested parties. The nomination process, membership and disciplinary balance of the STC are described below in Section 5.

- Review and approve reports to the Secretary of the Department of Commerce (or other funding agency) concerning the results of research conducted through the Research and Restoration Plan.

- Ensure the public is provided the opportunity to participate in Steering Committee meetings and to review and comment on proposed projects.

- The Steering Committee shall ensure the efficient and effective expenditure of funds. Whenever possible, projects shall be coordinated with other related research and restoration projects. Jointly funded research projects that meet the goals and priorities set by the Steering Committee shall be solicited.

4. Fiscal Responsibility

Fiscal responsibility for administration of the $5 million appropriated for this initiative by Congress for federal fiscal year 2002 (Pacific Coastal Salmon Recovery Fund) rests with the State of Alaska. Expenditures of these funds will be in accordance with the fiscal procedures and procurement policies of the State of Alaska. As a signatory to the MOU, State of Alaska agrees, as allowed by law, to expend these funds in accordance with the decisions of the Steering Committee.

5. Steering Committee Meetings

The Steering Committee shall meet as necessary to fulfill its responsibilities and conduct business.

Meetings of the Steering Committee shall be open to the public, and the public shall be provided reasonable notice of official meetings.

Meetings shall include, to the greatest degree practicable, participation by organizations active in fisheries research and restoration issues. Such organizations include, but are not limited to, the North Pacific Research Board, the Exxon Valdez Oil Spill Trustee Council, the Northern Fund of the Pacific Salmon Commission, and the Southeast Sustainable Salmon Initiative. These organizations shall be given reasonable notice of all meetings. Copies of all relevant STC recommendations, grant applications, project results and other information will be provided to these organizations and the public upon request. Comments, and direct participation when appropriate, shall be actively solicited from these organizations on relevant issues before the Steering Committee.

Notice of meetings and copies of relevant grant applications, project results and other information shall be provided to the Alaska Board of Fisheries, the North Pacific Fishery Management Council, and the Federal Subsistence Board upon request.

V. Scientific Technical Committee

1. STC Membership

The Scientific Technical Committee (STC) shall consist of six members nominated by the signatories to this MOU and the public. The Steering Committee shall select STC members from these nominations.

Members of the STC shall be selected based upon their knowledge, expertise and ability to fulfill the responsibilities of the STC as outlined in this agreement.

Membership shall represent scientific disciplines including, but not be limited to, fisheries sciences, socioeconomic sciences, aquatic habitat restoration, fish culture, marine ecology, freshwater ecology, community and population modeling, and population genetics. Members of the STC may be employed by the signatories to this MOU, and two members shall be ADF&G employees (one biologist, one social scientist from the Subsistence Division). However, no more than one member may be employed by any one of these groups or a federal agency, the Bering Sea Fishermen's Association or a regional Native organization. At least two members must be selected from the private or academic sector.

In addition to relying on its official members, the STC may consult with other scientific and local-knowledge experts in the development of the Research and Restoration Plan.

2. STC Responsibilities

STC members will exercise their best independent professional judgment to advance understanding of salmon abundance and distribution in the A-Y-K area and the fisheries they support, independent of the governmental, academic, or private sector they may represent.

The STC shall:

- Choose a Chair and Vice-Chair for the STC by consensus. The Chair will work closely with the Chair of the Steering Committee. The Vice Chair will act in the capacity of the Chair whenever the Chair is absent from a meeting.

- Within 12 months of the inception of the STC, develop an initial Research and Restoration Plan for A-Y-K salmon fisheries that is consistent with the Guiding Principals of the MOU, and recommend this plan to the Steering Committee. The plan shall identify research needs, , ensure the efficient expenditure of funds, not duplicate but complement other relevant research, and recommend research priorities.

- Develop recommendations for restoration projects that will increase salmon returns to the A-Y-K area.

- Develop a protocol for reviewing and ranking research and restoration project proposals and recommend this protocol to the Steering Committee.

- Evaluate suggested projects based on their merit and make recommendations to the steering committee.

- Regularly review the research and restoration plan and ongoing projects throughout the life of this MOU, including reviewing project design and the utility of continuing ongoing projects, and make relevant recommendations to the SC to ensure research and restoration is conducted effectively and efficiently, and make recommendations for augmenting, updating and revising research questions including regular review of the Research and Restoration Plan.

VI. Support for the Steering Committee and STC

The following support activities will be paid from funds appropriated for this effort:

- Travel and accommodation expenses for the individuals selected to serve on the Steering Committee and the Scientific Technical Committee.

- Professional Service fees for academic and private sector involvement on the Steering Committee and STC and support services for committee activities.

- Logistical support for the meetings of the Steering Committee and the Scientific Technical Committee, the coordination of communication and public outreach efforts, administrative support and the hiring of staff.

VII. Mutual Agreement and Understandings

It is mutually agreed that:

- Nothing in this agreement obligates any party in the expenditure of funds, or for future payments of money, in excess of appropriations authorized by law and administratively allocated for these purposes.

- Nothing in this agreement is intended to conflict with federal, state, or local laws or regulations, or international treaties or agreements. If there are conflicts, this agreement will be amended at the first opportunity to bring it into conformance.

- External policy and position announcements relating specifically to this agreement maybe made only by mutual consent of the signatories.

- All signatories shall meet on at least an annual basis to discuss matters relating to this agreement. Many of the criteria and assumptions contained in this agreement are interim assumptions and subject to further refinement. Signatories may request an earlier review. No revision shall be binding to signatories without the written consent of all signatories; provided that a revision that is proposed by the Steering Committee shall become effective 30 days after the Signatories and Steering Committee members are notified of the proposed revision if a majority of the Signatories have consented in writing to the proposed revision and no Signatory has delivered a written objection to the proposed revision.

- The effective date of this agreement shall be from the date of the final signature.

- Any signatory may terminate its participation in this agreement by providing to the other parties notice in writing 30 days in advance of the date on which its termination becomes effective. However, the State of Alaska agrees that in the event the State were to terminate early, the State will again initiate discussions with the parties, with the intent of developing an alternative research and restoration agreement. The State will not unilaterally proceed with research using funds appropriated or otherwise dedicated for this sustainable salmon initiative in the absence of an agreement among signatories.

VIII. Signatures

Frank Rue, Commissioner
Alaska Department of Fish and Game

Arthur Lake, President
Association of Village Council Presidents

David Allen, Regional Director
United States Fish & Wildlife Service

Loretta Bullard, President
Kawerak Incorporated

Jim Balsiger, Alaska Region
National Marine Fisheries Service

Steve Ginnis, President
Tanana Chiefs Conference

Adelheid Herrmann, Executive Director
Bering Sea Fishermen's Association

Underlined sections of the MOU were proposed for revision on February 23, 2003 in the document titled: *Consent to Revising the AYK Sustainable Salmon Initiative Memorandum of Understanding*. All signatories signed the written consent document and signatures are on file with the Administrative Agency.

104-297
SEC. 312. TRANSITION TO SUSTAINABLE FISHERIES 16 U.S.C. 1861a

(a) FISHERIES DISASTER RELIEF.—

109-479
(1) At the discretion of the Secretary or at the request of the Governor of an affected State or a fishing community, the Secretary shall determine whether there is a commercial fishery failure due to a fishery resource disaster as a result of—

(A) natural causes;

(B) man-made causes beyond the control of fishery managers to mitigate through conservation and management measures, including regulatory restrictions (including those imposed as a result of judicial action) imposed to protect human health or the marine environment; or

(C) undetermined causes.

(2) Upon the determination under paragraph (1) that there is a commercial fishery failure, the Secretary is authorized to make sums available to be used by the affected State, fishing community, or by the Secretary in cooperation with the affected State or fishing community for assessing the economic and social effects of the commercial fishery failure, or any activity that the Secretary determines is appropriate to restore the fishery or prevent a similar failure in the future and to assist a fishing community affected by such failure. Before making funds available for an activity authorized under this section, the Secretary shall make a determination that such activity will not expand the size or scope of the commercial fishery failure in that fishery or into other fisheries or other geographic regions.

(3) The Federal share of the cost of any activity carried out under the authority of this subsection shall not exceed 75 percent of the cost of that activity.

109-479
(4) There are authorized to be appropriated to the Secretary such sums as are necessary for each of the fiscal years 2007 through 2013.

(b) FISHING CAPACITY REDUCTION PROGRAM.—

109-479
(1) The Secretary, at the request of the appropriate Council for fisheries under the authority of such Council, the Governor of a State for fisheries under State authority, or a majority of permit holders in the fishery, may conduct a voluntary fishing capacity reduction program (referred to in this section as the 'program') in a fishery if the Secretary determines that the program—

ASSOCIATION OF VILLAGE COUNCIL PRESIDENTS
P.O. BOX 219
BETHEL, ALASKA 99559

ASSOCIATION OF VILLAGE COUNCIL PRESIDENTS
EXECUTIVE BOARD OF DIRECTORS

RESOLUTION 10-02-01

REQUESTING THE ALASKA STATE LEGISLATURE TO FUND ESSENTIAL RESEARCH ADDRESSING DISASTROUS AYK REGION SALMON DECLINES THROUGH THE AYK SUSTAINABLE SALMON INITIATIVE

February 17, 2010

WHEREAS, Alaskan salmon are critically important to the survival, subsistence economy and essential way of life for the people of the Yukon, Kuskokwim and Norton Sound regions: and

WHEREAS, the Yukon River has experienced disastrous declines of Chinook and fall chum salmon. In addition, Norton Sound has suffered the failures of Chinook salmon most dramatically in the Unalakleet River along with other species around the area for nearly a generation. These circumstances led to widespread restrictions and closures of subsistence and small scale commercial fisheries and caused nutritional, economic and cultural hardship for the thousands of tribal members who live in the Arctic-Yukon-Kuskokwim regions and depend upon the return of these salmon stocks for their health, well-being and way of life; and

WHEREAS, on January 15, 2010, the U.S. Secretary of Commerce, Gary Locke declared a fisheries disaster for Yukon River Chinook salmon in response to extremely low salmon returns in 2008 and 2009; and

WHEREAS, the Association of Village Council Presidents is a founding member and signatory to the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYK SSI) which serves as the ONLY collaborative multi-stakeholder effort addressing the pressing salmon research needs in the AYK region: and

WHEREAS, with the leadership and collaboration of the AYK SSI member organizations-- Association of Village Council Presidents, Tanana Chiefs Conference and Kawerak, Inc., the Alaska Department of Fish and Game, the National Marine Fisheries Service, the US Fish & Wildlife Service and the Bering Sea Fishermen's Association-- the AYK Sustainable Salmon Initiative has emerged as one of the largest and most successful working models of cooperative fisheries research in North America.

WHEREAS, the AYK SSI has worked with the National Research Council and its expert panel of salmon scientists to identify key knowledge gaps and established core research priorities through its Salmon Research and Restoration Plan; and

WHEREAS, the AYK SSI has begun the difficult work of understanding the causes of the declines of salmon in the region by collaboratively funding a number of salmon research projects in the region. Many critical salmon research needs remain unfunded at this time; and

WHEREAS, the Bering Sea Fishermen's Association has served as the administrative entity for the AYK SSI since 2002. BSFA provides essential staffing, contracting services, planning and administrative support for the AYK SSI.

NOW THEREFORE BE IT RESOLVED that we request the Alaska State Legislature to appropriate urgently needed funding to address the salmon research and restoration needs throughout the Arctic-Yukon-Kuskokwim regions of Alaska: and

BE IT FURTHER RESOLVED that we request that the Bering Sea Fishermen's Association serve as the recipient and fiscal agent of this and future funding directed to the AYK SSI salmon research program on behalf of the AYK SSI, with oversight by its Steering Committee as defined in the AYK SSI's 2002 Memorandum of Understanding.

CERTIFICATION

The foregoing resolution was adopted at Bethel, Ak by the Association of Village Council Presidents on February 17, 2010 with a quorum present.

Raymond J. Watson, Chairman

Myron Naneng, President

KAWERAK , INC. ○ P.O. Box 948 ○ Nome, AK 99762
TEL: (907) 443-5231 • FAX: (907) 443-4452

KAWERAK, INC.

Resolution 2010-02

REQUESTING THE ALASKA STATE LEGISLATURE TO FUND ESSENTIAL RESEARCH ADDRESSING DISASTROUS AYK REGION SALMON DECLINES THROUGH THE AYK SUSTAINABLE SALMON INITIATIVE

WHEREAS, Alaskan salmon are critically important to the survival, subsistence economy and essential way of life for the people of the Yukon, Kuskokwim and Norton Sound regions: and

WHEREAS, the Yukon River has experienced disastrous declines of Chinook and fall chum salmon. In addition, Norton Sound has suffered the failures of Chinook salmon most dramatically in the Unalakleet River along with other species around the area for nearly a generation. These circumstances led to widespread restrictions and closures of subsistence and small scale commercial fisheries and caused nutritional, economic and cultural hardship for the thousands of tribal members who live in the Arctic-Yukon-Kuskokwim regions and depend upon the return of these salmon stocks for their health, well-being and way of life; and

WHEREAS, on January 15, 2010, the U.S. Secretary of Commerce, Gary Locke declared a fisheries disaster for Yukon River Chinook salmon in response to extremely low salmon returns in 2008 and 2009; and

WHEREAS, Kawerak, Inc. is a founding member and signatory to the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYK SSI) which serves as the ONLY collaborative multi-stakeholder effort addressing the pressing salmon research needs in the AYK region: and

WHEREAS, with the leadership and collaboration of the AYK SSI member organizations-- Kawerak, Inc, Tanana Chiefs Conference, Association of Village Council Presidents, the Alaska Department of Fish and Game, the National Marine Fisheries Service, the US Fish & Wildlife Service and the Bering Sea Fishermen's Association-- the AYK Sustainable Salmon Initiative has emerged as one of the largest and most successful working models of cooperative fisheries research in North America.

WHEREAS, the AYK SSI has worked with the National Research Council and its expert panel of salmon scientists to identify key knowledge gaps and established core research priorities through its Salmon Research and Restoration Plan; and

WHEREAS, the AYK SSI has begun the difficult work of understanding the causes of the declines of salmon in the region by collaboratively funding a number of salmon research projects in the region. Many critical salmon research needs remain unfunded at this time; and

WHEREAS, the Bering Sea Fishermen's Association has served as the administrative entity for the AYK SSI since 2002. BSFA provides essential staffing, contracting services, planning and administrative support for the AYK SSI.

NOW THEREFORE BE IT RESOLVED that we request the Alaska State Legislature to appropriate urgently needed funding to address the salmon research and restoration needs throughout the Arctic-Yukon-Kuskokwim regions of Alaska: and

BE IT FURTHER RESOLVED that we request that the Bering Sea Fishermen's Association serve as the recipient and fiscal agent of this and future funding directed to the AYK SSI salmon research program on behalf of the AYK SSI, with oversight by its Steering Committee as defined in the AYK SSI's 2002 Memorandum of Understanding.

By: _____

Chairman

CERTIFICATION

I, the undersigned Secretary of the Kawerak, Inc. Board of Directors, hereby certify that the foregoing resolution was adopted by the Kawerak Executive Committee on this 16th day of February, 2010 by a vote of 7 for and 0 against the adoption of this resolution.

By: _____

Kawerak Board Secretary

TANANA CHIEFS CONFERENCE

Resolution # 2010-02

REQUESTING THE ALASKA STATE LEGISLATURE TO FUND ESSENTIAL RESEARCH ADDRESSING DISASTROUS AYK REGION SALMON DECLINES THROUGH THE AYK SUSTAINABLE SALMON INITIATIVE

February 26**, 2010**

WHEREAS, Alaskan salmon are critically important to the survival, subsistence economy and essential way of life for the people of the Yukon, Kuskokwim and Norton Sound regions: and

WHEREAS, the Yukon River has experienced disastrous declines of Chinook and fall chum salmon. In addition, Norton Sound has suffered the failures of Chinook salmon most dramatically in the Unalakleet River along with other species around the area for nearly a generation. These circumstances led to widespread restrictions and closures of subsistence and small scale commercial fisheries and caused nutritional, economic and cultural hardship for the thousands of tribal members who live in the Arctic-Yukon-Kuskokwim regions and depend upon the return of these salmon stocks for their health, well-being and way of life; and

WHEREAS, on January 15, 2010, the U.S. Secretary of Commerce, Gary Locke declared a fisheries disaster for Yukon River Chinook salmon in response to extremely low salmon returns in 2008 and 2009; and

WHEREAS, the Tanana Chiefs Conference is a founding member and signatory to the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYK SSI) which serves as the ONLY collaborative multi-stakeholder effort addressing the pressing salmon research needs in the AYK region: and

WHEREAS, with the leadership and collaboration of the AYK SSI member organizations-- Tanana Chiefs Conference, Association of Village Council Presidents, Kawerak, Inc., the Alaska Department of Fish and Game, the National Marine Fisheries Service, the US Fish & Wildlife Service and the Bering Sea Fishermen's Association-- the AYK Sustainable Salmon Initiative has emerged as one of the largest and most successful working models of cooperative fisheries research in North America.

WHEREAS, the AYK SSI has worked with the National Research Council and its expert panel of salmon scientists to identify key knowledge gaps and established core research priorities through its Salmon Research and Restoration Plan; and

WHEREAS, the AYK SSI has begun the difficult work of understanding the causes of the declines of salmon in the region by collaboratively funding a number of salmon research projects in the region. Many critical salmon research needs remain unfunded at this time; and

WHEREAS, the Bering Sea Fishermen's Association has served as the administrative entity for the AYK SSI since 2002. BSFA provides essential staffing, contracting services, planning and administrative support for the AYK SSI.

NOW THEREFORE BE IT RESOLVED that we request the Alaska State Legislature to appropriate urgently needed funding to address the salmon research and restoration needs throughout the Arctic-Yukon-Kuskokwim regions of Alaska: and

BE IT FURTHER RESOLVED that we request that the Bering Sea Fishermen's Association serve as the recipient and fiscal agent of this and future funding directed to the AYK SSI salmon research program on behalf of the AYK SSI, with oversight by its Steering Committee as defined in the AYK SSI's 2002 Memorandum of Understanding.

[Date / Signatures / Certification]

Jerry Leone

_____, President